THE IRON TRADE REVIEW

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CLEVELAND, O., DECEMBER 25, 1890.

THE WEEK IN IRON CIRCLES.

General Features.

The present time of year is always marked by lack of activity in way of placing new contracts for raw material, and the year just closing is proving no exception. In fact, less transactions than usual are being consummated, buyers both large and small occupying the conservative position that retrenchment is in order in many directions, and that until money again becomes plenty, it is wise to avoid placing further contracts or incurring new financial obligations. Some business is going in the way of car lots, but little is being done in way of large sales. Among the interesting features at present is the curtailment in pig iron production which is going on. This is especially seen in the Alabama district, where the coal miners' strike still continues, with no prospect for early settlement. A considerable number of furnaces have already blown out or banked, and those still running are simply using up stock on hand, with the exception of one or two large companies having other labor under their control. Many of the furnaces in the Mahoning and Shenango Valleys are also blowing out or banking, as they have found it impossible to continue the manufacture of iron with existing scale of cost for coke and other material. While it is a fact that consumption is less at present time than during the past Summer and Autumn, yet it is evident that production is being curtailed at a more rapid ratio than consumption. In some cases, it is noted at Chicago, low figures are being made by a few furnace companies having iron on hand on which they are forced to realize in view of interest or other payments, which are due or about to become so. At Louisville iron continues at the prices of our last report with no change. It had been thought that the strike would influence the market and a slight advance could be expected; so far, however, there has been no change, though in the last few days it is evident that the furnaces are beginning to feel that there is no object in offering iron at present prices as the indications point to a prolonged strike. It is felt that the present stock of iron will be shortly exhausted, and that if the present heavy demand keeps up prices must advance. Consumers, however, before paying anything but a slight advance, will use up the stocks already purchased, and in most instances buyers are in a position to run for sixty days, if necessary, on iron already in yard. The last report of stocks shows that there is an increase, in portions of the country, but in the South stocks will remain low for some time, owing to the reduced output. Consumption has remained large, though it is feared that after the first of the year it will fall off, owing to the trouble in money matters. For spot cash iron has been offered at Louisville as low as $9.75, Birmingham, for grey forge, but for future delivery $10.00 to $10.25 for grey forge is the price asked. Car wheel irons have been extremely low; the best Southern car wheel can be bought at $19.75, Louisville, for chilling grades. Our advices from Detroit are to the effect that while the stringency in the money market is not so great as it has been, yet it is sufficient to deter a considerable portion of consumers from placing orders for any large amount. The holiday season is usually dull, and the present is no variation from the rule. With the exception of a few sales of Southern iron for delivery extending for the first half of next year, dealings have been confined to small amounts for prompt shipment. There is quite a general feeling that after the first of the year the money market will be easier, and that business will be more active, and some are confident that values will range higher as soon as active buying begins. The market at St. Louis has been very quiet during the past week. However, there has been more inquiry for prices than during the previous two weeks. Prices are nominally unchanged, but concessions are made on special lots for prompt delivery. At Buffalo there are at the present time no indications of an early improvement in either demand or prices for pig iron. Should the combination of extreme scarcity of money and the very limited inquiry for pig metal continue it cannot fail to soon force the banking or blowing out of a number of furnaces. Whatever may be the future of production there are strong reasons for the hope that buying will be heavy after January 1st. This significant statement comes to us from St. Louis; "Warrants are hawked about and offers solicited much below prices that furnaces are willing to accept. Until these warrants are taken up and the demand for iron is materially increased, we can only look for the present depression to continue and possibly grow worse." The steel rail trade is in a bad way, the combination having gone to pieces, and demoralization in prices is quite sure to follow.

The Local Situation.

The holiday season, coupled with the annual running down of stocks and the objections entertained by iron men generally to any business engagements until the new year has fairly set in, all combine to produce an almost complete cessation of business, so that there is little left for comment. The only sale of pig iron that was traced during the week was one of two car loads of foundry iron, amounting to the enormous quantity of twenty-five tons, on which the profit did not amount to enough to buy a hat. Nobody expects any resumption of business in the immediate future, and there are those who say that it will be sixty days before anything like an active market may be expected. The publication of the iron ore figures, last week, has set a good many people thinking, and the producers of ore are quietly engaged in devising ways and means to improve their prospects. Their unanimous opinion is now, as it has been all along, that their interests are identical with those of the pig iron industry, and that whatever is done by way of concerted action must be done with the view of benefitting the furnacemen, who are in the worst position they have occupied for years. The very large amount of iron ore now on dock, together with the extreme improbability of working it up into finished material without delay, bids fair to cut severely into the ore business of next year, and the ore producers feel anything but encouraged at the prospect. The strikes reported from the South do not as yet seem to have had any material effect upon the sales of Southern iron in this market where, indeed, any sales are made, but it is thought that the tendency of the difficulty will be to reduce the output of Southern pig iron which for months has been flooding the Central West. The coke situation remains practically unchanged. The coke syndicate has a made a slight concession to the iron interests, amounting to twenty-five cents a ton, but the production is altogether out of proportion with the price of pig iron, so that the effect upon the market will only be nominal.

Merchant Iron.

There seems to be a slight weakening of the boom which, for several months, has been the distinguishing characteristic of this market. The mills, however, report a great many orders ahead which will keep them busy far into the new year, so that the slackening up may be ascribed to the holiday season more than to any other cause. The outlook for manufactured iron of nearly every kind is extremely good, the reports everywhere indicating great building activity as soon as the weather will permit

Scrap Iron.

Nothing whatever is doing in this line, and the dealers do not look for much activity short of sixty days. There is practically no market for scrap iron, at any price, and the trade is simply waiting developments.

A FRESH INVOICE OF CROCODILE TEARS.

The attitude of English papers, in reference to the expected repeal or modification of the McKinley tariff act by the incoming House of Representatives, is, indeed, amusing. It is only with great effort that they can conceal their glee at the outcome of the recent elections, yet they don't want to appear too glad—only just glad enough—lest their excessive anxiety shall work a revulsion of feeling on this side of the ocean. Thus the *Iron and Coal Trades Review*, in discussing the prospects of legislation more in the interest of British manufacturers, says: "Now, as bills "having this commendable object in view are certain to be promoted in "the coming session, we are hopeful that the Democratic party will be "able to repeal some of the more objectionable features of the new tariff, "which are found to cause more injury to native industries than loss to the "foreign manufacturer or exporter." The deep and abiding interest in the native industries of the United States on the part of our foreign contemporaries is, indeed, refreshing. They have always shown such disinterested affection of American industries that we ought not to be surprised at anything; but this exhibition of concern for our welfare is too much—too much.

Yet, our London contemporary would not have its tears of sympathy flow too freely, lest it overdo the thing; hence it adds: "Any attempt, "however, from this side, either by the foolish meetings held a few "months since at Sheffield, or by the action of the Cobden Club, to "dictate to the people of America when and how they should regulate "their Tariff to our liking will assuredly be resented, and very justly "resented, as experience has already shown." In other words, our friends are so wonderfully tender of our feelings that they abhor even the appearance of "dictating;" they simply express a philanthropic concern for the well-being of the poor, down-trodden American consumer, and leave their allies in the next Congress to do the rest.

HOW LONG BEFORE WELSH TINPLATES WILL DISAPPEAR?

A very adroit address was recently delivered to his employes by Mr. J. H. Rogers, managing partner of the South Wales Tinplate Works, Llanelly. Mr. Rogers had just returned from the United States, where he had been looking up the prospects of tinplate manufacture in this country, and the drift of his address was to calm the fears of his workmen as to the probable destruction of the Welsh tinplate industry by reason of the McKinley act. Mr. Rogers hastened to assure his hearers that there was no need for fear; that it had taken the United States from ten to thirty years to build up such industries as button making, sheet iron, steel rails and pig iron, and that, during this long interval, the Welsh makers would have ample time in which to seek new markets, seeing that the industry increased at the rate of about ten per cent. a year. That the American market would ultimately be lost to the Welsh manufacturers, he did not express a doubt.

Two reasons for the new duty were given him by Senator Sherman, which are worth repeating: The first one was: Supposing there was a European war, and supposing Russia and France joined together against Germany and England, and that Russia and France got command of the sea, and thus prevented England from shipping tinplates to America; such a condition of things would mean the absolute ruin of the canneries, and almost ruin of the farmers who raised fruit and those who reared cattle. Those industries would be at a standstill until the war would be over. Again, supposing there was a general strike or lock-out in the Welsh trade, or if the colliers struck or were locked out, the American canneries would come to a standstill.

These reasons, the speaker thought, were the best and most statesmanlike he had heard—and certainly they are cogent ones.

AMERICAN LOCOMOTIVES FOR AUSTRALIA.

A significant triumph for American industries is the recent order by the English Government of twenty-seven locomotives for New South Wales, for use on a new Government railroad in that colony. The order in question goes to a Philadelphia firm and is based on the conceded advantage of American-built locomotives for climbing heavy grades and turning sharp curves. The freight locomotives are of the heaviest and strongest build, and, with tender attached, will each weigh from eighty to eighty-five tons. The cost of the American-made locomotive is from $8,000 to $12,000. Those destined for Australia will be sold to the Government there for about $10,000 apiece, the sale aggregating over a quarter of a million dollars.

ACCORDING to the *Engineering News*, the total addition to the railroad mileage of the United States between January 1, 1890, and January 1, 1891, has been nearly 5,800 miles, or about 700 miles more than in 1889. The total amount of railway completed January 1, 1891, is 167,172 miles, of which 22 per cent. has been constructed during the past five years. The South Atlantic group of States shows the greatest amount of new mileage.

SOME ONTARIO MAGNETITES.

BY T. D. LEDYARD, TORONTO, CANADA.

Sir William Logan, our great geologist, predicted that Canada would become, eventually, one of the greatest iron producing countries of the world. Although possessed of numberless deposits of iron ore, we have not yet done much to verify this prediction. Causes can be found for our backwardness, the principal one being the want of a market. A glance at the map shows that the small population of Canada is too scattered to support extensive iron manufactures. Six good-sized iron mines would supply the ore necessary to make all the iron and steel used in Canada, even if we used nothing but our own make, instead of importing the greater portion, as we do at present. And distances in Canada are too great in proportion to the small consumption to encourage home manufactures on a large scale.

But while Canada is suffering for want of a market, many parts of the United States would be benefitted by the free admission of Canadian ores. The Eastern States could get cheap ores from Quebec and Nova Scotia, and many Pennsylvania furnaces could obtain Bessemer ores from Ontario at much lower rates than they are now paying for imported foreign ores.

GEOLOGY OF THE ONTARIO IRON DISTRICTS.

Dr. Robert Bell, Assistant Director of the Geological Survey of Canada, in his "Geology of Ontario,"* says: "The name Huronian (derived from Huron) was first given by the Geological Survey of Canada more than 40 years ago, and has been adopted by geologists in other countries as universally as the term Laurentian, and is made to include all the rocks lying between the Laurentian, below it, and the Cambrian, or earliest fossiliferous rocks above. Some of the rocks of the district stretching between the counties of Lanark and Hastings, in Eastern Ontario, which were formerly included in the Laurentian series, are now believed by some to belong rather to the Huronian. An attempt has been made quite lately, among some American geologists, to restrict the name Huronian to rocks like some of those north of Lake Huron, although Sir William Logan and his colleagues, in introducing the term originally, described it as applying equally to the dark grayish and greenish schists, conglomerates, diorites, etc. The more extended investigations which have since been made in Canada and other parts of the world, have confirmed the propriety and convenience of including under this name all the rocks which had been originally described as Huronian. The Huronian, as above defined, is the great metalliferous system of Ontario, as well as of Northern Michigan and Minnesota, and hence its great importance in the economic geology of the country. The whole series is more or less metalliferous, but the various ores are not uniformly distributed, some occurring in one region or in some special stratum, while others may prevail in another section of country or in a different horizon in the series. Iron appears to occur most frequently in the lower or schistose portions of the Huronian system."

SOME MAGNETITE DEPOSITS.

This paper will be confined to a short description of certain ores found in the counties of Peterboro and Haliburton, and in the more easterly portions of the Province of Ontario. Those which will be mentioned are probably among the most important, yet comprise only a few of the ores which have come under the writer's notice. Magnetites only will be here taken into account, although hematites are found in these districts in deposits of considerable importance and sometimes of great purity.

Prof. E. J. Chapman, Ph. D., of the School of Science and University College, Toronto, says: "This area of Ontario is traversed in a general northeast and southwest direction by belts of elevated rocky land, consisting of unstratified, probably eruptive, syenites or syenitic granites of a prevailing red color. Between these belts lie rugged tracts of essentially synclinal structure, occupied in ascending order by strata of red and gray gneiss and by some crystalline graphitic limestones, succeeded, more or less irregularly, by dark green amphibolic and pyroxenic rocks, with which the iron ores are chiefly associated."

THE BELMONT IRON MINE.

About 110 miles east of Toronto, six miles north of the branch of the Canadian Pacific Railway, between Toronto and Montreal, on lot 19, in 1st concession of the township of Belmont, county of Peterboro, is found a large deposit of rich magnetic ore, closely resembling in mode of occurrence some of the Lake Superior mines. Experts estimate that this ore bed contains at least 1,000,000 tons of ore within 100 feet of the surface, from which there should be no difficulty in producing 400 or 500 tons a day.† The ore is very high in metallic iron, and by no means refractory in the blast furnace. Samples taken from the pits possess a fine texture, and show but small traces of phosphorus and sulphur, with a high percentage of iron, constituting an almost ideal Bessemer ore.

The stripping is so light that the ore should be mined, by the use of

*Mineral Resources of Ontario, pages 17 to 22.
†Prof. Heys, Report, 1885, and Prof. C. Gordon Richardson, Report, 1890.

compressed-air drills, at a cost of 50 cents per ton, being so free from rock matter that little culling will be required.* No trouble with water is to be anticipated, the ground possessing a natural drainage to the west, which can be improved and utilized at slight expense.

A special feature of this deposit is its proximity to the surface, necessitating but little expense for stripping, as mining can be done in pay rock almost from the commencement.† Some hematite is found on the east side in conjunction with soapstone.

Prof. Chapman says: "This is an exceedingly good ore, not too dense in texture, rich in metal, quite free from titanium and practically free from phosphorus and sulphur, and is well adapted for the Bessemer process."

The following analyses have been made, the first being from surface samples:

	Metallic Iron.	Phosphorus.	Sulphur.	Silica.	Manganese.
No. 1	64.26	Faint trace.	0.04	.....	.....
No. 2	65.36	0.002	Trace.	4.5	.....
No. 3	66.23	0.024	Trace.	3.19	0.42
No. 4	68.88	0.006	Trace.	3.18	.....
No 5	68.85	0.008	Trace.	1.96	.....
No. 6	69.99	0.012	Trace.	3.10	.....

No. 1 was made May, 1884, by Prof. E. J. Chapman; No. 2, July, 1886, by W. F. Brugman, chemist of the Scranton Steel Co.; No. 3, November, 1887, by the chemist of the Joliet Steel Co.; No. 4, same date, by Prof. Davenport Fisher, Milwaukee; Nos. 5 and 6, August, 1888, by the chemist of the Cambria Iron Co.

Much of the rock matter surrounding this ore deposit is composed of epidote diorite.

THE BLAIRTON IRON MINES.

Four miles south of the Belmont mine are the Blairton iron mines, at the village of that name, on Lot 8, in 1st Concession of Belmont, about two miles from the Canadian Pacific railway.

At this place, originally known as the "big ore bed," there are large deposits of magnetic iron ore, averaging probably 50 to 55 per cent. metallic iron, and low in phosphorus, with no titanium. Analyses have shown 0.035 phosphorus.

A considerable amount of ore has been taken out of these mines, as much as 300 or 400 tons daily having been produced here at one time. A large and deep excavation has been made, 150 feet wide by 250 feet long, and a second opening 160 feet deep lies south of the first.‡

On the east side the deposit is capped with Silurian limestone, while the west well is a jaspery quartzite. The strike is west of north. In the wall, quartz and serpentine predominate. This ore is much mixed with rock, necessitating a good deal of culling, which renders mining expensive; and there has been sulphur in some parts of the deposit from the beginning.

This is one of the many iron mines in Canada which cannot be worked at a profit for export under the present United States duty of 75 cents per ton. If there were no duty this mine would doubtless be worked; it is capable of producing largely. At present the only use that can be made of such ore is to smelt it in a local charcoal furnace, there being plenty of hard wood in the neighborhood from which charcoal can be cheaply made, and limestone for flux not being far distant.

CENTRAL ONTARIO RAILWAY MINES.

There are several large deposits of magnetic ore on or close by the Central Ontario railway in the north part of the county of Hastings. Some of these ores are of Bessemer quality (after roasting out the sulphur), but unfortunately the mines are now lying idle, owing to serious dissensions among the owners. The statement has been made that these ores are worthless, and that the mines are not worked on account of the sulphur in the ore; but this is surely not the true reason. Nearly 800,000 tons of magnetic iron ore are annually taken out of the Cornwall hills in Pennsylvania and used as Bessemer ore, although containing an average of 2 per cent. sulphur and only about 48 per cent. metallic iron; and nearly 700,000 tons of other sulphurous ores, some of them being hard magnetites from the States of New York and New Jersey very similar to Central Ontario ores, are annually used in the United States. The sulphur entails an additional cost in roasting; but where other injurious elements are absent, a sulphurous ore, after being properly roasted, often can be used in the manufacture of Bessemer iron.

The roasting should be carefully done in Davis-Colby or other suitable roasters, where plenty of oxygen is supplied during the process. The ore should be broken up fine enough and plenty of time given to make the roasting effectual.|| This should be done where fuel is cheap, at a cost not exceeding 25 cents per ton. The cheapness of mining and freight would much more than counterbalance this expense on some Ontario ores.

Many of the Central Ontario ores could be conveniently shipped to furnaces in Pennsylvania by returning American coal cars, which bring coal into Canada, but now usually return empty.

*Report of F. D. Taylor, M. E., 1886.
†Prof. C. Gordon Richardson, Report, 1890.
‡Report of the Royal Commission on the "Mineral Resources of Ontario," 1890, p. 127.
||See Dr. Valentine's paper of October, 1889, Trans., xviii.

SNOWDON IRON DISTRICT.

The townships of Snowdon, Galway and Glamorgan in the county of Haliburton, about 40 miles northeast of Lindsay, contain several valuable deposits of iron ore.

Lots of 25, 26 and 27 in the 4th Concession, Snowdon, on the south side of Burnt River, contain several outcrops of magnetite extending about three-quarters of a mile. This ore is on high ground overlooking the river and railway track, and most conveniently situated for mining by drifts or tunnels run into the hillside, the mine-cars running by gravity to the shipping platforms or pockets at the railroad.

The following analyses show these ores to be very low in phosphorus:

	Metallic Iron.	Phosphorus.	Sulphur.	Silica.	Titanium.
No. 1	61.48	0.01	0.16	.....	None.
No. 2	62.	Trace.	0.025	1.7	"
No. 3	62.57	0.025	Trace.	.....	"
No. 4	63.	Trace.	0.025	3.1	"

No. 1 was made by Prof. E. J. Chapman; Nos. 2, 3 and 4 by chemists of different iron works in Pittsburgh, whose names are not in my possession.

Concerning analysis No. 1, Dr. Chapman says: "A fine grain magnetic ore from the Howland mine, Lot 26 in 4th Concession, Snowdon. The ore near the surface is very pyritous, but becomes almost free from pyrites in descending. The sample was taken from a depth of 81 feet from the surface. A second shaft has been sunk on another part of the deposit to a depth of about 30 feet. The deposit is apparently an elongated stock-formed mass of large extent. It has been opened over a length of about 80 feet."

The railway passes through Lot 20 in 1st Concession, Snowdon, on which are several outcrops of magnetite, one of them cross-cutting the Monck road, where it was first discovered. Prof. Chapman has analyzed a surface-sample and found it to contain metallic iron, 60.18; phosphorus, 0.08; sulphur, 0.04; titanic acid, 0.73. He describes it as a black magnetic, fine grained ore, somewhat porous in texture. The deposit is apparently a stock-formed mass of large size, as shown by recent borings and excavations. Another analysis is given, showing metallic iron, 61.02; phosphorus, 0.052; and still others have shown metallic iron as high as 65 per cent.

This district is about 200 miles from Buffalo, N. Y., to which point the ores could be delivered very cheaply in returning coal-cars. Moreover, these deposits are not much more than 100 miles from Midland, Ontario, whence ore could be shipped to a boat to Chicago in returning grain vessels. Limestone suitable for flux is found in close proximity to the ores, and there is abundance of hard wood suitable for charcoal. There is also brown hematite in the neighborhood, yielding 45 to 48 per cent. metallic iron, which would mix well with the magnetic ores in a charcoal furnace.

The Paxton mine, in the adjoining township of Lutterworth, has produced several hundred tons of ore yielding 55 to 60 per cent. iron with no titanium and traces only of sulphur and phosphorus.

Ores from different parts of Galway township, south of Snowdon, have given the following analyses:

	Metallic Iron.	Mang. oxide.	Phosphorus.	Sulphur.	Titanium.
No. 1	62.37	Trace.	0.012	Slight trace.	None.
No. 2	62.60	1.27	0.068	Slight trace.	"
No. 3	65.	.....	0.04	0.02	"
No. 4	80.40	.....	Trace.	Trace.	"

Nos. 1 and 2 were made by Prof. Chapman; Nos. 3 and 4 by Prof. Thos. Heys, formerly lecturer on chemistry in the Toronto School of Medicine.

VARIOUS ORE DEPOSITS.

Professor Chapman has also made the following analyses of magnetites from this district which are free from titanium, viz.: No. 1,* from township of Glamorgan. A black crystalline, highly cleavable ore, carrying 70.38 metallic iron, with merely traces of phosphorus and sulphur. There are a few ore exposures and needle attractions showing a strong body of ore extending over a length of about 400 feet by 40 feet in width. No. 2 is an ore corresponding almost exactly in its cleavable structure and composition with No. 1, although it comes from another place several miles distant. Samples taken from a small trial pit show 70.5 per cent. metallic iron with rock matter under 3 per cent., but the ground is practically undeveloped.

No. 3. A black, fine granular ore from the vicinity of Apsley village, in the northern part of the township of Burleigh. Metallic iron, 63.68 per cent.; phosphorus, a trace only; and sulphur, 0.03. The intermixed rock matter is essentially pyroxenic. Ground undeveloped.

No. 4. A very rich magnetic ore from the township of Madoc, the dried ore yielding 69.16 metallic iron; phosphorus 0.04; and sulphur, 0.03; with silicous rock matter, 3.32.

No. 5. A magnetic ore mixed with specks of actinolite from Madoc township. The sample contained nearly one per cent. pyrites, and yielded iron, 60.32; phosphorus, a trace; and sulphur, 0.52. Another sample from the same property gave iron, 62.54; phosphorus, 0.03; sulphur, 0.38.

KINGSTON AND PEMBROKE DISTRICT.

The following analyses have been made of magnetic ores from the country tributary to the Kingston & Pembroke Railway:

* These five analyses are numbered in Professor Chapman's list 9 to 13 inclusive.

	Metallic iron.	Phosphorus.	Sulphur.	Silica.	Titanium.
No. 1.....	65.33	0.017	.....	.....	None.
No 2.....	65.	Trace.	Trace.	2.14	"
No. 3.....	62.	0.006	Trace.	4.12	"
No. 4..	60.	0.009	.....	6.31	"
No 5.....	52.	0.035	0.10	6.53	"
No. 6..	65.07	0.07	0.05	6.66	"
No. 7..	66.34	0.14	Trace.	1.04	Trace.

No. 1 was made June, 1883, by Ledoux and Ricketts; Nos 2, 3, 4 and 5 by a chemist employed by the Kingston & Pembroke Iron & Mining Co; No. 6, November, 1871, by J. Blodgett Britton; No 7 by a chemist unknown to me. This analysis, with Nos. 2, 3, 4 and 5 was published by the Minister of Agriculture in connection with the mineral exhibit of Ontario at the Cincinnati Exposition of 1888.

TITANIFEROUS ORES.

In Minden, the township lying north of Snowdon, there are large quantities of magnetic ores, containing a considerable amount of titanium. A black, granular, strongly magnetic ore from near Lake Kushog showed, by Dr. Chapman's analysis*, the following results: Metallic iron, 51.56; titanium, 15.64; sulphur, 0.17; phosphoric acid, trace; silicious rock matter, 4.08.

Similar ore is found on several adjoining lots, and there appears to be a good deal of titaniferous ore in this and neighboring townships.

There is an enormous deposit of black, strongly magnetic ore in the township of Glamorgan, about half a mile south of Burnt river. The deposit rises abruptly in the form of a succession of ledges to a height of from 80 to 100 feet above the general level of the ground, and is exposed in an easterly and westerly direction for at least 1,800 feet, with an average width of 140 feet. The analyzed sample contained 52.04 metallic iron; 8.11 titanium; 0.005 phosphorus; and 0.06 sulphur.

Another deposit of similar ore has been found some distance from the one just described. This ore carries from 8 to 10 per cent. titanic acid, which appears to be persistent throughout the whole ore bed, the yielding of metallic ore being nearly 60 per cent.; phosphorus 0.007; and sulphur 0.08.

It may be remarked that titaniferous ores in these districts are generally very low in phosphorus, and if some treatment could be found whereby the injurious effects of the titanium could be got rid of they might be used in making steel.

Dr. Chapman remarks that "the presence of these titaniferous in close proximity to deposits in which no trace of titanium can be detected, is a fact of much interest hitherto apparently unrecognized in the iron districts of Europe."

The writer feels warranted in protesting against the habit, which has prevailed in some quarters, of characterizing all Canadian ores as titaniferous. Nothing could be more unfair. Canada is a country of great extent, and it is just as absurd to class all Canadian ores as titaniferous because those objectionable ores are found in some places, as it would be to condemn Lake Superior ores because titanium is found in some parts of northern Minnesota. Ontario contains, as I have shown, many ores perfectly free from titanium, although there are certain ranges or belts of territory in which titanium prevails to a considerable degree.

Many of the magnetite deposits in Eastern Ontario are rich in iron, and carry, too, very low percentages of phosphorus and sulphur with no titanium at all. Others are high in sulphur but free from other impurities, so that they require roasting only, in order to make them available as exceedingly pure 60 per cent. ores. Finally, the rates of wages in these districts generally range from $1 per day for laborers to $1.25 for miners; and, as has been observed, the commercial conditions of transportation are exceedingly favorable. Nothing seems to be lacking but access to the market of the United States.

Scribner's Magazine, for January, opens the fifth year and ninth volume of a periodical, which from its first issue was a popular success, and which has continued to grow rapidly in public favor. Its prospectus for 1891 contains the names of a number of contributors who are unrivalled in their special fields—men like Henry M Stanley, James Bryce, Sir Edwin Arnold and Robert Louis Stevenson. The readers of the "Railway" and "Electric" series will be glad to know that a similar series on "Ocean Steamships" is promised. The issue for January contains a number of striking features—first among them Henry M. Stanley's article on the "Pigmies," which is entirely distinct from his book, and written since its publication expressly for the magazine. Other features are Sir Edwin Arnold's second paper on "Japan," with Robert Blum's remarkable illustrations; the first of a two part story by Frank R. Stockton, in his most amusing manner; one of a group of illustrated papers on Australia (marking the beginning of an Australian edition of the magazine); and practical articles on modern fire apparatus, and the game of Court Tennis.

AN emergency hospital, with an ambulance corps attached, is to be established at the Homestead Steel Works, of Carnegie, Phipps & Co. The building will be located on the grounds near the general offices, and will be fitted up with all the conveniences of a first-class place of the kind. It is also intended to have an ambulance wagon built, which will always be kept ready for service. The hospital will have an ambulance corps on duty day and night, and injured persons will be given surgical treatment at once.—[Bulletin.

*All the analyses of titaniferous ores here given were made by Professor Chapman.

BEST AND CHEAPEST POWER FOR THE SMALL SHOPS.

This question interests at present the widest circles. State administrations, representatives of communities and the large numbers of small industries are occupied with its solving. We shall bring, in the following, in short and comprehensible form, what has been accomplished—theoretically and practically—in this line.

The principal thought is: motive force is produced in a center in large quantities (thus as cheap as possible) and is given over against payment from this center to each consumer. In accordance with experiences made, most adapted are: (1) gas, (2) electricity, (3) compressed air. The gas, as everybody knows, is produced in retorts and conducted in pipes to the places of consumption; for its production, only warmth is needed, no motive force. It is cheaper to produce gas motors than lighting gas. Electricity and compressed air want for their production steam or water. The conducting of electricity is managed in overhead or underground cables, the conducting of the compressed air in pipes underground. Gas and compressed air can be accumulated in gasometers, respectively in boilers, and distributed thence, according to requirements; with respect to electricity, this cannot be done yet—*i. e*, the accumulation is feasible, but too expensive.

From the adduced can be gathered that the answering of our question cannot be the same for all industrial places. Wherever gas works, with good plants, extensive pipe system, cheap coal, have existed for a long time, the invested capital, for the greater part, being paid off, the gas motor machines will keep the field yet for a long time to come.

Where there are no gas works; wherever the gas works are too small or too expensive; where, anyhow, new pipes must be provided and laid for motor gas; wherever coal is dear, it is a different case altogether, and in such cases competition takes place, and, most probably, the motive force will make the scales turn in its favor. For instance, Furth, in Bavaria, possesses its own gas works, and had made an agreement for the supply of motive force with the Compressed Air Co., Riedinger & Co., in Augsburg; whereas, Pforzheim, in Baden, which has also its own gas works, is in negotiation with Schuckert & Co., in Nuremberg, who have worked out sketches already for the production of electricity by motive force.

Compressed air is produced, while by means of a steam engine or water motors air is drawn in and condensed by compressors—mostly to six atmospheres—which is conducted into large boilers or reservoirs and distributed thence. The application is made in pneumatic machines, built like steam engines; the compressed air goes behind or in front of the piston and moves it; mostly steam engines are working as pneumatic machines without even being altered. The largest compressed air plant is in Paris, where in the Rue St. Fargeau about 5000 horse power (steam) compress the air. Newly introduced improvements are: injections of water into the compressors and heating of the compressed air, before it is used in the motor, from 150–170° C., whereby the efficiency of the plant is considerably increased, but the working—especially by the heating of the compressed air—gets more troublesome. A partly advantageous, partly disadvantageous quality of the compressed air is the generating of cold; the air gets latent with so much warmth during the expansion, that it cools down to less than 0°, when it comes out and produces ice. This coal is used with great advantage by confectioners, butcheries, store houses, etc., but is troublesome if not applied. Singular and characteristic for Prussian conditions is the fact, that many large dining-rooms, theatres, etc., are provided with compressed air, propelling with it a pneumatic machine, the latter moving the dynamo machine for electrical lighting.

Electricity is produced by a steam engine or water motor moving one or several dynamo machines, from the latter the generated electrical stream is conducted by cables to the places concerned; the cross section of these cables must be adapted to the distance and quantity of electricity. In the place where it is wanted stands also a kind of dynamo machine which is connected or disconnected by the producing or interruption of the electric current. Large plants are working here successfully.

We wish to call special attention to this, that a motive power machine for small industries must be, before everything, simple and easy to serve and that not the cheapness of the supplied force is decisive; for a force, which is in itself the cheapest, can get expensive for the consumer, if it is not to be had always and regularly and if its use is connected with circumstantially or is only made possible if a technically educated personnel is at disposal.

As much as the supply of motive force is important for industrial places as different the respective plants will have to be; anyhow, the time has come in which great attention is to be given to the matter.—[Kuhlow's German Trade Review.

A Good Move of Alabama Manufacturers.

The Alabama Industrial and Scientific Society was organized at the University of Alabama, on Thursday, December 11th, 1890, with 70 members. The objects of the society are the promotion of the industries of the State, and the furtherance of scientific investigation of the problems that arise in civil and mining engineering, geology, smelting and the manufacture of coke. The officers for 1891, are: President, C. Cadle, General Manager, Cahaba Coal Mining Co., Blocton; six Vice Presidents, viz: Thomas Seddon, President Sloss Iron & Steel Co., Birmingham; C. P. Williamson, President Williamson Iron Co., Birmingham; W. E Robertson, City Engineer, Anniston; J. W. Burke, President Tredegar Co., Jacksonville; M. C. Wilson, Professor National Science Normal School, Florence; Col Horace Harding, U. S. Engineer, Tuskaloosa; Treasurer, Henry McCalley, Alabama Geological Survey, University of Alabama; Secretary, W. B. Phillips, Professor of chemistry and metallurgy, University of Alabama. The annual fee is $5. The society will meet three or four times a year, at different places in the State, for the reading and discussion of papers, which will afterwards be published for the use of the members, and for general distribution. Next meeting at Birmingham, January 28th, 1891.

AMONG THE IRON MINES.

Lake Superior Mining Notes:—

MARQUETTE RANGE.

The second shaft to tap the iron ore deposits of section 16, of the Lake Superior Iron Co., found ore at a depth from surface of 325 feet, ore being of the same fine quality as noticed at other points throughout the mine. The ore in the first shaft was encountered at a depth from surface of 275 feet, showing that there is quite a sharp dip to the northwest. The ore in the second shaft is said to be an entirely different deposit from that found in the one to the east, a large dike coming into the fissure and separating the two.—[Iron Ore, Ishpeming.

Mining work has been stopped at the South Jackson mine, Negaunee, the pumps withdrawn, and 80 men discharged. The reason assigned for this is the unsettled condition of the market, the depression in price of non-Bessemers, and the further fact that the ore was not of the best quality for the class. We hear that there will probably be considerable of this kind of thing throughout the entire Lake Superior district, within a short time, unless there is a decided change for the better. That the change will come, and soon, is earnestly to be hoped.—[Iron Ore.

The work of reopening the No. 7 Jackson shaft, closed early in the season by a cave-in, has been completed, and as soon as the water can be forked out mining operations will be resumed. When the work of pumping commenced there was between 50 and 60 feet of water, which has been reduced to about 16 feet at present. When it is stated there is nearly, if not quite, two acres of ground opened in the bottom, something of an idea may be formed of the quantity of water yet to be handled. From the great depth, the work of pumping is slow, and attended with more or less uncertainty. Frequent mishaps occur to the machinery under the strain, so that the average progress is slow. It is expected, however, to free the mine of water during the current month.—[Negaunee Iron Herald.

Over two-thirds of the men employed at the Volunteer mine (Palmer), some 200, were discharged recently on account of the inability of the management to make sales of ore. For the year, about 140,000 tons of ore has been produced, of which about one-half has been sold at $4 35, in Cleveland. Of the remaining amount some 60,000 tons is in Cleveland, and has been offered at $3 35—a break of $1 per ton—without takers, which is really less than the cost of production. This being the case, no other course is left but to restrict the product. The ore is a non-Bessemer well up in metallic iron, and works well in the furnace. In view of the fact that the mine is well equipped, is well developed, and in shape to produce cheaper than ever before, the present exigency is not a pleasant one. Men familiar with the present condition of the market predict that other mines of this class will be forced to close down during the Winter. Under the present condition of the market, it is certain a majority of the non-Bessemer mines can't pay expenses. How long this condition may hold is a matter of serious conjecture—[Negaunee Iron Herald.

MENOMINEE RANGE.

The diamond drill work at the Monongahela is showing up an abundance of sand, the drill bit having penetrated 150 feet of that material. It is estimated that the depth of sand is 170 feet. The location gives no room for doubt but that the ledge will be iron ore.—[Diamond Drill.

"Curtail expenses" is the order now all along the line, which means in many cases, on some ranges the entire suspension of work, in others a greatly reduced force. The mines in this city have been worked with full force up to the present time, but of course, the same conditions prevail here as have affected the iron mines elsewhere, and it is not unexpected news to learn that the force at the Chapin mine will be reduced, to what extent has not yet been decided. The reduction will be gradual, and possibly before Spring the force will be reduced one-half. There is but little encouragement in crowding mining work under the present prospects, and it will be the policy of the company to go slow until the condition of the ore trade warrants a more vigorous prosecution of work. The *Range* sees no reason at present why a fairly good year next season may not be expected for Bessemer ores, notwithstanding the present apathy of the market. The demand for manufactured iron is good, and there is a prospect of continued demand which, by Spring, it seems to us, ought to relieve the ore market sufficiently to make the demand for Bessemers fairly active.—[Menominee Range, Iron Mountain.

The drift in the north slope of the second level of the Mansfield mine shows a length of vein over 50 feet greater than in the level above. It is thought that with depth the vein will be found to contain marketable ore up to and beyond the old Caledonia property. At that property the ore has the same general characteristics, but it is so intermixed with jasper bands as to render it unavailable. This undesirable feature shows itself slightly at the extreme north of the Mansfield first level, but in the second it does not appear as yet. In the third level it will probably not be encountered at all. Another thing to the good of the property is that the vein is widening with depth There is not a mine in the district with more flattering prospects than the Mansfield.—[Diamond Drill.

Report has been received here that operations have been entirely suspended at the Iron River mine at Stambaugh, and that the pumps are being taken out. This means the abandonment of the mine for an indefinite period, and the ruination of at least one of the shafts. The cause of this remarkable action on the part of the company, is said to be due to the fact that all the first-class ore has been taken out of the mine, and that the ore in sight is of a very inferior quality, for which there is no market. The suspension of mining at Stambaugh is a severe blow to that community, and much hardship will consequently result.—[Florence Mining News.

VERMILION AND MESABA RANGES.

One of the most prominent iron land owners on the Vermilion range said to a Duluth *Herald* reporter: "I regard the Mesaba as a great iron range. The old time cry about a thin blanket formation is entirely exploded by the late wonderful developments. It is true that the iron formation of the Mesaba is not so much inclined as that of the Vermilion range, but in most places is nearly horizontal. I regard that, however, as an advantage to the Mesaba, because it enables the mines to be worked much cheaper than they could be in a vertical formation or vein. There is no question but that the Mesaba is destined to have a great future.". Even those who have looked with doubt on the Mesaba range, and who, as owners in Vermilion properties, have been more or less interested in casting discredit on the Mesaba properties, are now willing to admit that the Mesaba is destined to be one of the greatest iron producing districts in America or the world.

At the Macomber mine, two working shafts have been sunk parallel with the trend of the vein, about 100 feet apart. These shafts are connected by a tunnel through solid ore at a depth from the top of the shafts of about 60 feet. As the main working shaft, however, is in the side of a hill, a cut or run has been made to some distance in the hill before the shaft was sunk; consequently, from the surface to the tunnel a distance of about 100 feet intervenes. Two crosscuts have been made, the one 35 feet and the other 25 feet long, at a distance of 80 feet apart, with excellent results. The vein of ore is found to be unbroken. The ore itself is of a very high grade, some of it averaging as high as 69 per cent. A portion of the ore is soft and the rest hard, so that, altogether, it will be much more easily worked than the ordinary hard ore. A stock pile of ore is being accumulated as fast as possible. It is the intention to sink the shafts about 60 feet more, so as to enter another level 50 or 60 feet below the first one, so that next year two levels can be worked. At least 25,000 tons will be shipped in the year, and perhaps much more.—[Duluth Herald.

The World's Fair Proclamation.

By the President of the United States of America—A proclamation:

Whereas satisfactory proof has been presented to me that provision has been made for adequate grounds and buildings for the uses of the World's Fair Columbian Exposition, and that a sum not less than $10,000,000 to be used and expended for the purposes of said exposition has been provided in accordance with the conditions and requirements of section 10 of an act entitled "An act to provide for celebrating the 400th anniversary of the discovery of America by Christopher Columbus, by holding an international exhibition of arts, industries, manufactures and the products of the soil, mine and sea, in the city of Chicago, in the State of Illinois," approved April 25, 1890. Now, therefore, I, Benjamin Harrison, President of the United States, by virtue of the authority vested in me by said act, do hereby declare and proclaim that such international exhibition will be opened on the first day of May, in the year 1893, in the city of Chicago, in the State of Illinois, and will not be closed before the last Thursday in October of the same year. And in the name of the Government, and of the people of the United States, I do hereby invite all the nations of the earth to take part in the commemoration of an event that is pre-eminent in human history, and of lasting interest to mankind, by appointing representatives thereto, and sending such exhibits to the World's Columbian Exposition, as will most fitly and fully illustrate their resources, their industries and their progress in civilization.

In testimony whereof I have hereto set my hand and caused the seal of the United States to be affixed.

Done at the city of Washington, this 24th day of December, 1890, and of the independence of the United States the one hundredth and fifteenth. By the President, BENJAMIN HARRISON.

JAMES G. BLAINE, Secretary of State.

Coming Steel Armor Tests.

A test of steel armor plates is soon to take place at the Sandy Hook Proving Ground, under the supervision of the War Department. The plates alone are not to be tested, but they are to be used in test trials of projectiles. The War Department has recently advertised for proposals to furnish the plates, which must be of open-hearth steel, forged, oil tempered and annealed. The plates are to be of different thicknesses, from nine to 11¼ inches, and of uniform manufacture. The tests will be made by firing steel shot of the best quality against the plate, so that the center of the shot hole will not be nearer than about two calibers of the gun to any edge. An 8 inch gun will be fired in the ballistic test against the 9 inch plate, with a striking velocity of 1,200 feet a second, corresponding to an energy of 3,000 foot-tons. In the test of the 11¼-inch plate, a 10 inch gun will be used, the striking velocity to be 1,120 feet a second, corresponding to an energy of about 5,000 foot-tons. The whole of the projectile must not get through the plate, nor must the plate break up during the impact so as to detach a piece or expose the backing.

The Canadian Duty on Tubing.

All lap-welded iron tubing entered under item 414 of the Canadian tariff will be subject to the following regulations:—The importer on making entry at Customs must subscribe to a special affidavit, to be written on the face of such entry, to the effect that the said tubing is lap-welded and is of the diameter of —— inches actual inside measurement, and that it is for use exclusively in artesian wells, petroleum pipe lines or petroleum refineries, as the case may be, and that it will not with his consent be sold to be used, nor will it, with his consent, be used for any other purpose whatsoever. Recently Messrs. McMaster and Hudson, of the Montreal Rolling Mills, had an interview, at Ottawa, with Hon. Mr. Bowell in reference to the duty on wrought iron pipe. They pointed out that this material is being imported at an undervaluation and urged that a specific duty should be imposed upon it instead of an *ad valorem* duty. They also made representation to the Minister on the subject of duty on tacks.

IT is more than probable than an international congress of engineers will be held during the Columbian Exposition in Chicago.

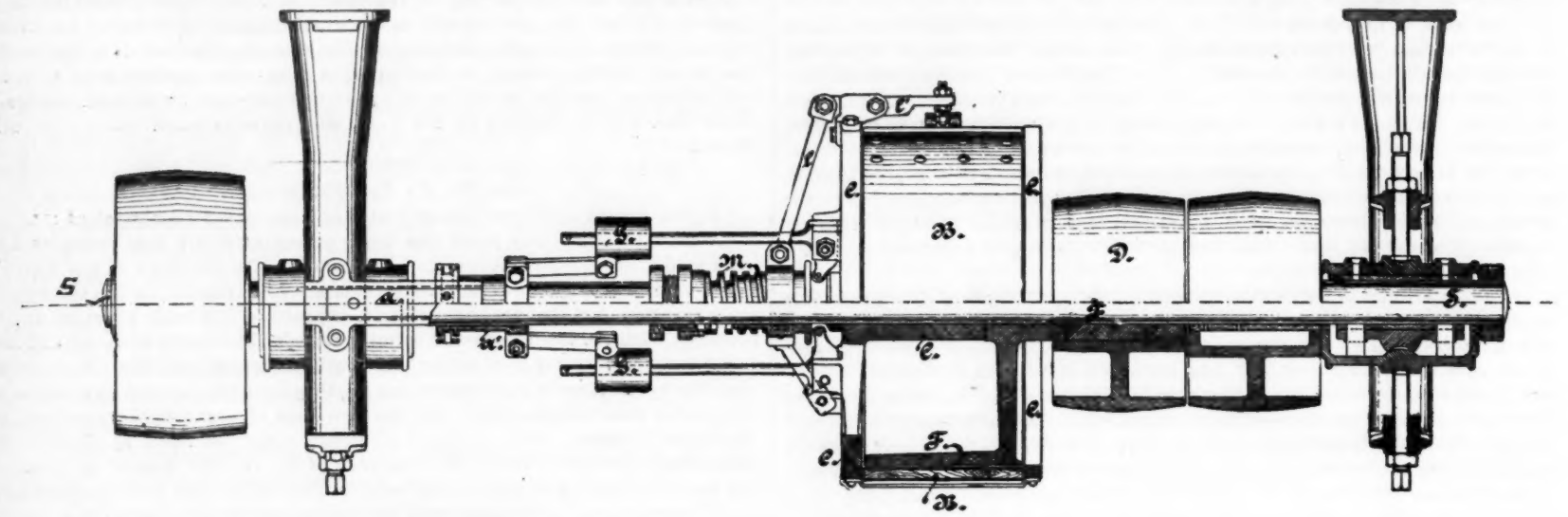
THE FOOTE INTERMEDIATE SPEED REGULATOR.

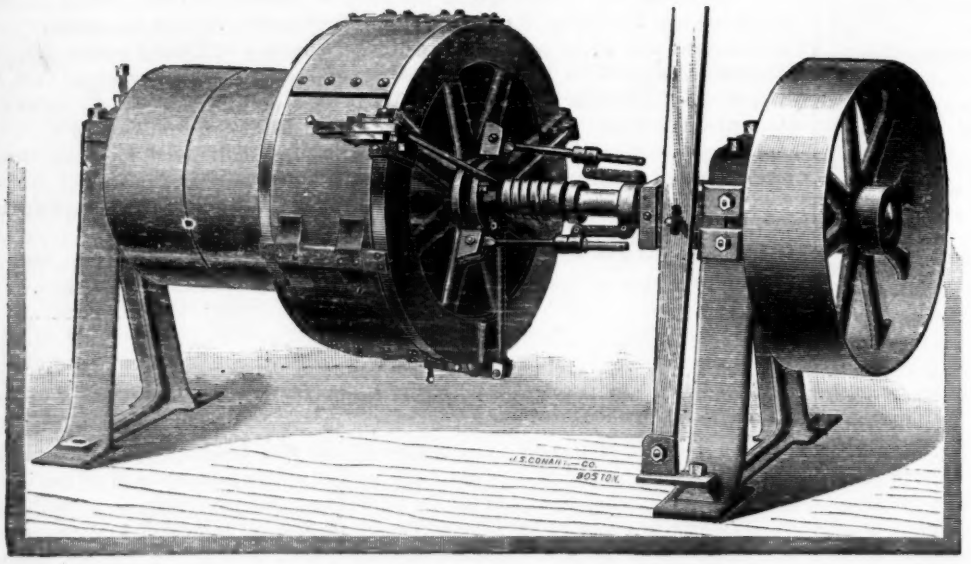
This apparatus is designed for use on line and counter-shafting, to equalize the power delivered by the engines, water wheels, and electric motors; insuring, it is claimed, an absolutely unvarying speed to electric generators, or other purposes where a very steady and uniform revolution of shafting or machinery is desired The manufacturers especially recommend the device in electric railway works, where the variations of load are so great, causing the engines to run either above or below their nominal rated speed as the load may be greater or less, as the case may be. One application of this device, which is of special interest, is its use in connection with water wheels. It is a well-known fact that there is not a satisfactory governor for water wheels in existence; and, with changing loads and different loads of water, it is impossible to obtain the required uniformity and regularity of speed demanded in dynamos and electric generators. Water power promises to become an important factor in electric railway works, because of the possibilities of transmission which makes available power, which is in some cases to be obtained at a very small expense.

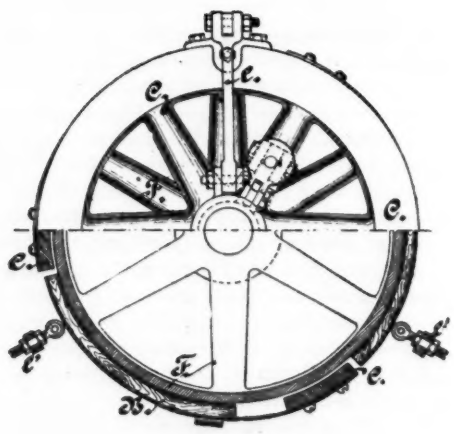
The description of the regulator as shown in the sectional view is as follows: The main features are a friction coupling between the driving pulley and the shaft to be driven, and a governor which regulates the amount of pressure on the friction surface. As shown, the apparatus is in the form of a countershaft, D is the driving pulley, and is keyed on a projecting sleeve to which is attached the bands bearing on the friction wheel, and forming one portion of the machine. When the friction surfaces are not in contact, it is free to revolve independent of the shaft S S.

The brake shoes B, which are made of leather backed by wood and sheet steel, are brought in contact with the friction wheel by the spring M, which acts through the levers L and L, which have their fulcrums on the carrier C, which is fast to the shaft S S. The arms of the governor G G at their fulcrums have an extension at right angle, which presses against the spring M, diminishing the pressure brought to bear on the brake shoes through the medium of the levers L and L.

The tension of the spring M and weights on the arms of the governor are determined and adjusted according to the speed and powers required. It is understood that the speed of the driven D is somewhat in excess of the speed required for the shaft S S. The arms and weights of the governor when in revolution fly outward, owing to the centrifugal force and compress the spring M to such extent as will allow of the proper amount of friction to give the desired speed. Chandler & Wittlefield, Room 40, Marine Building, Chicago, are the general Western agents.







THE FOOTE INTERMEDIATE SPEED REGULATOR.

A New Use for Scrap Iron.

Mr. Easton Devonshire, an English civil engineer, now in Cincinnati, O, made an experiment at the office of the superintendent of the water works in that city, recently, to demonstrate the Anderson process of purifying water. The principle of this process is the showering of small pieces of scrap iron, such as punchings of plates, through a stream of water. This is accomplished by means of a cylinder rotating horizontally on hollow trunnions fixed at its two extremities. The impure water enters by one trunnion and passes through the cylinder at a regular speed, and is discharged by the opposite trunnion. During the flow of water through the apparatus, scrap iron is scooped up by shelves attached to the cylinder, and caused to fall through the stream of water. By this means, the iron is kept constantly polished and in the most active condition for purifying the water. The inventor of the process is William Anderson, an eminent English civil engineer. The chemical effects of the agitation of the iron in the water is to create an oxide of iron, which, on leaving the cylinder, is precipitated in the form of rust.

In the process of its formation, the rust coagulates the clay or other suspended matter in the water and forms with it a flocculent precipitate. This precipitate is eventually strained out of the water by a bed of sand, leaving the water brilliantly clear and free from both suspended and organic matter. The process has been in use for several years in Europe for the purification of city supplies, being readily applicable to large volumes of water. The revolving purifier, as it is called, is owned by an English syndicate, which proposes to demonstrate the possibility of purifying the whole water supply of Cincinnati. The experiment was a great success, but through the inadequacy of the small machine used, the full benefit of the process could hardly be determined. at this time and in an absolutely definite manner.

Condition of Blast Furnaces.

The monthly blast furnace report, as published in the last number of the *American Manufacturer*, shows a total of 345 furnaces in blast on December 1, with a total weekly capacity of 181 453 tons. Furnaces out of blast numbered 190, with a total weekly capacity of 65.441 tons. Of this total, 169 furnaces in blast, having a total weekly capacity of 123 886 tons, were bituminous furnaces, and 71 bituminous furnaces, with a weekly capacity of 38,694 tons were out of blast. Compared with November 1, there was a total of three more furnaces in blast on December 1, with a total increase in weekly capacity of 1,000 tons. The number of bituminous furnaces in blast on December 1 was the same as a month previous, but the total weekly capacity was decreased 73 tons.

Investing in Cuba

It is rumored that an American syndicate is negotiating for the purchase of several manganese mines recently discovered near Bayamo, and that, in case the syndicate secures control of them, it will construct a narrow gauge railway to Manzanillo, whence the ores will be shipped to the United States. During the month of October, there were exported to the United States from St. Jago de Cuba 25,150 tons of iron and 3,150 tons of manganese ores.

THE INDISPENSABLE LATHE DOG.

There has always been more or less annoyance, inconvenience and loss of time in machine shops from the fact that the old style of lathe dog must be adjusted to the work before centering it in the lathe.

The Indispensable lathe dog overcomes these objections. It can be used equally as well between collars as upon plain or straight work, where it would be necessary in using the ordinary dog to select one much too large for the shaft or mandrel, and then be compelled to pack up to fill the space, as is now so often the case. It can also be used for locking work on the mandrel n case of its slipping. Our great claim is that one set of three Indispensable

dogs will do the work that it usually requires from ten to twelve of the old style of dogs to do, and at about one-half the cost. No well-regulated machine shop can afford to be without one or more sets of Indispensable lathe dogs, and after a trial they will be found, as their name indicates, "Indispensable." They are made of steel castings and fitted with steel set-screws.

The way these dogs have taken with machinists who have seen them and the number of orders received have exceeded the manufacturers' expectations. They are manufactured by the Indispensable Lathe Dog Co., of Philadelphia, and are controlled and introduced by Palmer, Cunningham & Co., Limited, 607 Market street, Philadelphia, Pa.

CAST IRON COLUMNS VS WROUGHT STEEL COLUMNS.

In searching for information as to the relative advantages of cast iron columns over those made of steel, we have had communicated to us the six lucid and forcible reasons which follow, showing why cast iron is to be preferred: 1. Economy. Cast columns are much less expensive than steel columns required to carry the same load. 2. Speed of delivery. Cast columns can be entirely supplied by Chicago foundries, saving time required for transportation of steel columns from place of manufacture. Much less time is required for manufacture of cast iron columns than for the riveted steel work. 3. Adaptability. A cast iron column can be made of any shape desired. Connections can be arranged for attaching other parts of the construction much more readily and satisfactorily than can be done in the use of steel columns 4. Value as scrap. In case buildings erected are to be reconstructed or demolished, the cast iron as scrap has a much higher than the steel. 5. Corrosion is much less rapid, and much less destructive to cast iron than to steel. Cast iron may be exposed for years and show very little loss from rust. Steel after an exposure of a few months will deteriorate very rapidly, the whole surface of the metal peeling off repeatedly in scales, while anything is left. 6 Cast iron columns have been well tested by use during a very long period. Steel columns are still an experiment. What time will do with large structures supported by riveted work and liable to rapid corrosion remains to be seen.

To the strong and impressive reasons, above specified, we are able to add the personal knowledge of some experts that, in several of the lofty buildings in this city, cast columns were furnished at 35 per cent. to 51 per cent. less than estimated for steel columns—a verdict of experience which speaks with a very loud emphasis on the question of relative cost. The same authorities tell us that they have often found the sustaining capacity of cast columns as much as 100 per cent. greater than that of steel columns for same load and use. Positive facts like these are ramparts of certainty, alien to all the processes of theoretic assumption, and they greatly strengthen the position occupied by the advocates of cast iron columns. It should be distinctly and fully understood, however, that the decided superiority claimed for cast iron columns over the customary riveted work of steel has no reference whatever to tensile property, or power to resist the strain of drawing apart, but relates to power to resist the crushing strain of superincumbent weight, a column's capacity to hold up against pressure without giving way being its supreme standard of excellence. So far as our inquiries have extended, we have not found any record or any recollection of cast iron columns breaking by pressure from over-weight. The absence of auch an event from a wide range of experience posseses a significance which requires no comment. Among the other advantages claimed for cast iron is greater safety in case of fire, as the liability of the riveted steel article in to warp, curve and yield under the influence of severe heat is a defect in any upright support loaded with a heavy mass.

I nregard to comparative tendency to corrosion, there is really no dispute, as even Carnegie, Phipps & Co., in an article in their own book on structural steel, state that the liability of rust or oxidization is greater in steel than in cast iron.

One competent authority expresses the opinion that the popularity of steel columns will not stay, if the makers of cast iron will take pains to demonstrate the merits of cast iron columns. He thinks that when foundrymen can say to owners: "We have testing machines, and have put 100, or 200, or 300 tons on this column, and examined it for defects with the load on it; and it is sound and safe for 50, or 100, or 200 tons," as the case may be, they will regain the trade they are now losing, as the price of cast iron is materially less than the price of wrought iron or of steel. He says further that "the great and effective arguments in riveted wrought columns are that rolling produces sound, uniform material which can be inspected easily, while cast iron is liable to hidden defects which the average architect cannot discover, and consequently never feels safe about." This authority tells us, finally, that "if cast iron is good enough, and can be produced sound enough, for locomotive cylinders, it certainly will regain its lost ground for building purposes, when the makers wake up."—[Industrial World, Chicago.

GRAPHICAL RECORD OF EFFICIENCY OF A STEAM PLANT.

An interesting paper on "A Graphical Method of Showing the Relative Efficiency of a Steam Plant," by H. F. J. Porter, M. E., is printed in the *School of Mines Quarterly* for November. It gives the result of daily records of the steam plant of records of Columbia College for the past five years. During the Summer of 1884 and the following Winter the steam piping of the boiler house was rearranged on a manifold system, so that the boilers could be used independently or together, by any desired combination on any or all of the buildings, and the steam piping of the buildings was arranged so that the whole plant would work as a unit, and not as a collection of units as before. The exhaust steam from all the engines, pumps, etc., was turned into the heating mains, and after performing its work of heating, all the steam was returned in the condition of condensed water to the boilers. The result of the rearrangement of the plant was the reduction in the coal bill of over 50 per cent.

In the year from November, 1884, to October, 1885, inclusive, 1,563 tons of Lehigh lump coal was used, costing $4.60 per ton, or a total of $7,192 In the following year, after making the alterations, only 1,093 tons was used, nearly all being Lackawanna pea coal, the average cost per ton being $2 84, and the total cost $3,104. The principal use of the steam was for heating purposes, only a small amount being required for power. An hourly record of the temperature of the outside atmosphere was kept in the boiler house, and a daily record of the quantity of coal used. By plotting these records on a diagram the relation of coal consumption to temperature could be clearly seen, and by a comparison of these diagrams, the relative efficiency of the operation of the steam plant at different times was determined. The following table gives the monthly totals of the year 1885-86:

Months.	Mean temperature.	Gross tons of coal used.	Rate per day.	Total cost.
November	44 93°	108 57	$11.60	$347.56
December	35 70°	185.70	16 77	519.99
January	26 79°	235 71	21.28	659 90
February	27.45°	198 57	19 85	556 00
March	37.60°	155.00	14.00	434.00
April	52.87°	80.10	7.46	224 00
May	60.18°	38.57	3.48	108 00
June	68 05°	9.28	.86	25.93
July	74 83°	8.57	.77	24.00
August	70.19°	8.57	.77	23.99
September	65 25°	10.00	.93	29.00
October	54 90°	54.29	4.90	152.01
Year	51.56	1,092.83	8.50	$3,103 86

The following is a recapitulation for the series of years during which the records were kept:

Years.	Mean temperature, not including June, July, Aug. and Sept.	Coal, gross tons per year.	Cost per ton.	Rate per day.	Cost per year.	Relative efficiency obtained from the diagrams.
1884-5	39.99°	1,563.54	$4.60	$19.70	$7,192.41	1.1056
1885-6	42.55°	1,092.83	2 84	8.50	3,103 86	1 2250
1886-7	41.42°	1,132.13	3.79	11.66	4,255 96	1 3500
1887-8	38.77°	1,264.05	4.13	14.30	5,226 05	1.2570
1838-9	43.49°	1,065.55	3.88	11.35	4 140.77	1.1840
1889-90	44 96°	1,123 35	3 11	9.71	3,491.39	1 2000

The figures for efficiency are obtained from the ratio between the areas circumscribed by the curves representing coal and temperature. The coal curve, when indicating the greatest efficiency, should be parallel with the temperature curve, and as far below it as possible. In the year 1889-90 buckwheat coal was used instead of pea, which accounts for the reduction in cost.

Cheaper Aluminum.

Mr. Eugene H. Cowles, President of the Cowles Electric Smelting & Aluminum Co., of Lockport, has stated to a reporter of the *Sun* that their new process of electric reduction of pure aluminum directly from the ore has reached such a stage as to enable them to produce metal, 98 per cent. pure, at a cost of $1.25 per pound. It is proposed to utilize the entire Lockport plant for the production of aluminum by the new process, and the capacity of the works is estimated at from ½ to ¾ ton per day. The production of aluminum in alloys of iron and copper will be abandoned at these works.

$7 a Ton Pig Iron.

The *Manufacturers' Record* has in its posession a report made by one of the leading members of the British Iron and Steel Institute, an expert of the highest standing, on an iron property in the South, which he says, is more valuable than the Cornwall property of Pennsylvania or any of the Lake Superior ore properties. This report says that the ore can be mined for 30 cents a ton, and that pig iron can be made at that point for $7 a ton.

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make a study of Artistic Printing? If not, call on us in our new, light and commodious quarters, and inspect our work. A half hour's examination of our samples will convince you that we are fulfilling our purpose of doing the

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in all our branches of Printing, Book-making, Blank Book Manufacturing, Book-binding, Engraving, Embossing, Electrotyping, etc., and on an extensive scale. Our purpose is to employ artists in every department, and we will not be content with doing work just as everybody else does it. We seek for new, original and striking effects, and our patrons say that we succeed in pleasing them better than any other establishment in Cleveland. This gives us encouragement.

Very respectfully,

THE CLEVELAND PTG. & PUB. CO.,

CLEVELAND, OHIO.

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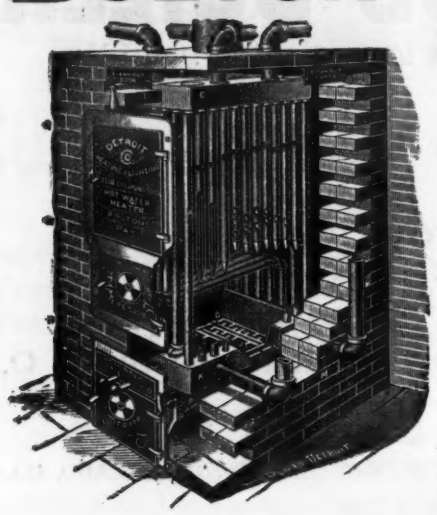

Best for Warming Dwellings, Greenhouses, Schools, &c.
Most Economical, Durable and Easily Managed.

HOT-WATER Safe. Clean.

BEST RECORD IN CANADA AND THE BLIZZARD NORTHWEST. **HEATER**

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No Bolted, Flanged or Packed Joints; therefore cannot Leak.
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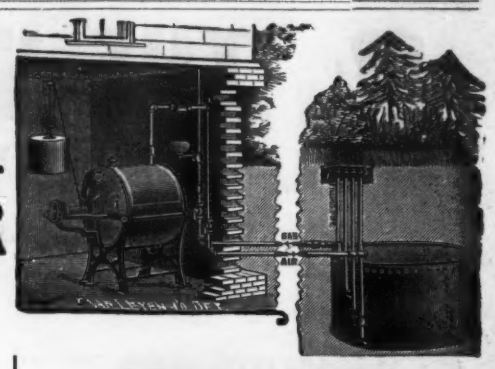

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Gas Machine

Best Independent Gas Apparatus

For Country and Suburban Residences, Churches, Schools, Stores, Hotels, Etc.

Over 20 Years in use, with never an Accident.

Average cost of gas, ½ cent per hour per burner.

INDUSTRIAL SUMMARY.

New Enterprises :—

Paulus & Williamson Architectural Iron Co. has been incorporated at St. Louis; capital stock, $10,000.

The St. Joseph Bridge & Boiler Works have been incorporated at St. Joseph, Mo., with a capital stock of $42,000.

It is reported that Haselton, Pa., is to have a nail factory of $120,000 capital stock. It is to be established on the co-operative principle.

M. T. Holland, of St. Louis, Mo., will, it is reported, establish in Middlesborough, Ky., works for the manufacture of steam and water registers.

M. B. Reber, J. C. Neal and others have incorporated, at Charleston, W. Va., the New York & Ohio Co., for the purpose of manufacturing machinery, electrical supplies, etc.

A. H. Pierce Manufacturing Co., at Chicago, with a capital stock of $50,000, will do a general manufacturing business. The incorporators are Arthur H. Pierce, H. A. Uhl and H. A. Ritter Parrotte.

The Buda Iron Works, of Buda, Ill., capital $24,000, for the manufacture of railway supplies and architectural iron work, has been incorporated by M. J. Knipple, A. J. Fisher, L. J. Akin and S. Toomey.

The authorities of the town of Port Arthur, Ont., propose to bonus the first 50-ton iron blast furnace that may be erected there to the extent of $25,000, and to the first ore dock $15,000.—[The Canadian Manufacturer.

The International Aluminum Co., at Chicago, capital stock $10,000,000, for the manufacture and use of aluminum, incorporators Franklin Babcock, Wm. A. Pfaff and Charles H. Wood, has been entered for incorporation at Springfield.

Stever-Godfrey Co. is a new incorporation at Chicago, with a capital stock of $1,000,000, to manufacture lubricators. The incorporators are James J. Stever, Everett D. Godfrey, Philetus Smith, Alvin M. Bentley, Stearns F. Smith, Arthur E. Stover.

The Superior Manufacturing Co., of Springfield, O., and Chamberlain & Riders, of Hudson, Mich., are reported as investigating with a view of locating their agricultural implement factories in Glasgow, Va. If these companies decide to locate in Glasgow, they will consolidate and operate under one management.

The American Railway Co. is the title of a corporation recently formed in Denver, Col., for the manufacture, sale and control of the patent of an improved sanitary stock car which promises to revolutionize the live-stock shipping interests of this and other countries. The incorporators of the company are Messrs. Vidler and Pierce, of Denver, who own all the patents involved, and John C. Avery, J. H. Crandall, B. Plumb and George B. Pullman.—[The Railway Register.

Among the manufacturing companies recently incorporated in Michigan are the Sullivan Plumbing & Heating Co., at Bay City; capital stock, $5,000; and the Lake Shore Iron Works, at Marquette; capital stock, $100,000. The latter concern will occupy the large factory at Marquette, vacated by the Iron Bay Co. at the time of its removal to Duluth. The directors are John M. Longyear, Peter White, Charles Y. Osburn and Alfred Kidder, of Marquette, and Charles D. Sheldon, of Houghton.

The Toledo Machine Tool Works, Toledo, O, formerly owned and operated by G. H. Danielson, has been changed into an incorporated company, with $30,000 capital stock, under the style of the Toledo Machine & Tool Co. Mr. Danielson will continue with the new company as manager of the business, which, as heretofore, will be the manufacture of presses, dies, special machinery and all kinds of sheet metal tools. The names of the incorporators of the company are: G. H. Danielson, E. A. Phillips, E. P. Breckenridge, E. A. Edwards and J. D. Riggs.

Enlargements, Additions, Removals, etc :—

The Eureka Cast Steel Co, of Chester, Pa., is adding to its plant an open-hearth furnace of the Siemens-Martin type of eight tons capacity. The work is to be completed early in 1891.

The Bellaire Stamping Co., Bellaire, O., has commenced the erection of a new three-story iron building on the site of the old frame structure. The new concern will have nearly double the capacity of the old.

The capital stock of the Barnum Wire & Iron Works Co., of Ontario, has been increased from $45,000 to $100,000. It is understood that the works are to be removed from Windsor, Ont., to West Toronto Junction.—[The Canadian Manufacturer.

Furnaces and Works Starting Up :—

The Benwood Iron Co., Wheeling, W. Va., started up its nail factory last week. On the week previous it shipped 4,000 kegs of nails by river to the South.

The Continental Tube Works, of Pittsburgh, Pa., started up last Monday. The mill was compelled to shut down some days ago by reason of the fire in the pattern and machine shops.

The Tonawanda Iron & Steel Co., Tonawanda, N. Y., will blow in its Niagara furnace between Christmas and New Year. The furnace has been rebuilt, and is now 17x75 feet, with a number of improvements in equipment.

The Landon Iron Co. lighted the fires in its Chaplnville furnace, on the 1st inst. The blast was turned on next day, and on the day following a good cast of No. 3 iron was made. Everything started off successfully, and the company expects to turn out about 100 tons per week, mostly of Nos. 3 and 4 car wheel iron. The iron is sharp, open grained and very strong, giving a high drill.

General Industrial Notes:—

The Lambert Bros. foundry at Ironton, O., has just made the largest casting ever made in that section. It was a 10,000-pound roll for the Ætna Iron & Steel Works, at Bridgeport, O.

The output of the Ætna Iron & Steel Co.'s plant at Bridgeport, O., for November was over 5,000 tons of finished sheet iron and steel, the largest for one month in the history of the mill. The Ætna contemplates some extensive improvements.

The American Iron & Steel Works, of Jones & Laughlins, Limited, at Pittsburgh, Pa., are being operated in every department with natural gas. Two new wells recently sunk on gas territory owned by the firm are expected to furnish sufficient gas to operate the plant for a long time to come.

Sealed proposals will be received at the office of the Supervising Architect, Treasury Department, Washington, D. C., until two o'clock P. M., on the 15th day of January, 1891, for all the labor and material required for the plumbing, gas-piping, etc., for the United States Court House, Post Office, etc., building at Denver, Col.

Sealed proposals will be received at the office of the Supervising Architect, Treasury Department, Washington, D. C., until two o'clock P. M. on the 8th day of January, 1891, for all the labor and materials required to put in place complete the iron vault doors for the United States Court House, Post Office, etc., building at Charlotte, N. C.

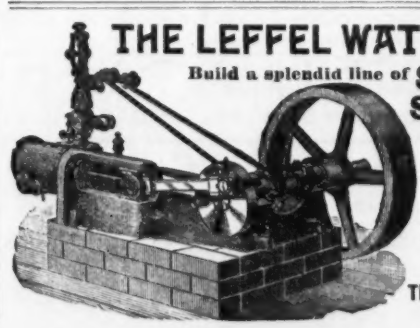
In those parts of our country where the picket and wire fence was first introduced it has become the general favorite and very little other fence, and in many places no other fence, is being built. When properly built it will stand up firm and straight as long as the posts will stand and new posts can be inserted as the old ones become decayed. The best quality of No. 12 galvanized annealed steel wire is estimated to have a tensile strength of 800 to 1,000 lbs. to each single wire, so that when three cables of wire are used, one at the top, one at the bottom, and one in the middle of the pickets, it can be made at an expense of about nine cents per rod for the wire. It makes a fence strong enough to resist the strongest animals and hardest windsand also to turn the smallest, and no danger whatever of any kind of injury to stock. Among the best machines for making this fence is the Garrett, manufactured by S. H. Garrett, Mansfield, O.

THE LEFFEL WATER WHEEL & ENGINE CO

Build a splendid line of **SELF-CONTAINED SIDE-CRANK ENGINES**

—AND—

RETURN-FLUE BOILERS



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Furnishes more steam with less fuel, and generates steam more rapidly, than any other boiler in use.

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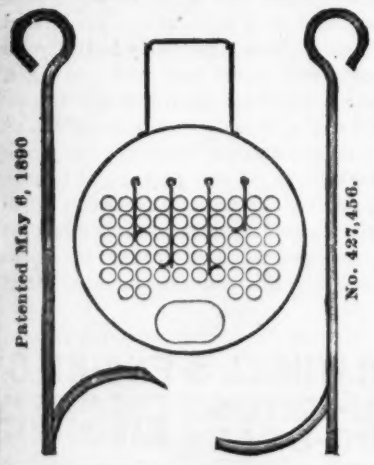

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A scraper for the OUTSIDE of your BOILER FLUES that will remove the SCALE and SEDIMENT, and keep them clean without injury to the iron. They are made to fit any size flue, and will save their price the first time used.

Price $10 a set, sent on 30 days' trial. Send outside diameter of flues.

GENTS:—I have used your Bauer's External Boiler Flue Scrapers, and find them very useful in keeping the lower tubes clean, and I would not be without them. Yours very respectfully,

ALSE McLEAN,
Engineer Chamber of Commerce,
Minneapolis, Minn.

Send for circular of both the Scraper and of our Sensible Automatic Packing.

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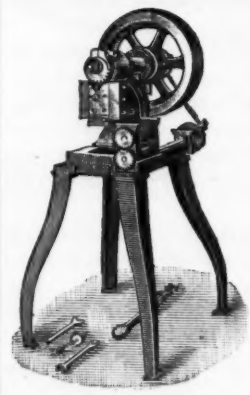

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Dies for all kinds of sheet metal goods, leather, paper, etc. Inventors' models and specialties. Send for circulars and prices.

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Phosphorus, sulphur, silica, hornblende and other impurities eliminated from Iron Ore, and non-Bessemer ore converted into Bessemer Ore. Samples treated without charge. Correspondence solicited.

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YOU ARE INVITED TO

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Bring your Works, your Experience and Energy. Bring your Family and Friends. Bring Capital.

The advantages are great, and those who have the courage to make a new departure and the sagacity to see the opportunity, will move first and secure a new and ever increasing market for all kinds of iron products.

The Southern People will henceforward promote and put their orders with Southern manufacturers. There is no sentiment about this, it is purely business.

They save freights, get cheaper goods and build up home enterprises. They are bent upon this purpose, and the end of the day is fast approaching when it will pay to ship raw materials from South to North to be manufactured and sent back.

The following Industries are badly wanted South and will pay, if well located and conducted by experienced people.

Structural and Architectural Iron Works—there is only one of any importance South. Pipe Works, both wrought and cast iron pipe, Car Works, Stove Works, Rolling Mill for plate and bar; all kinds of Railroad Supply and Angle Iron.—In fact, all kinds of iron works, patent articles and specialties.

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Will donate a location with ample ground, and if needed, will **contribute Cash Capital** to the right parties.

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It is in the center of the great iron and coal supply of Virginia, Alabama and Pennsylvania. Here are cheap iron, cheap fuel, cheap living, cheap labor, churches, schools, water works, gas, etc. No strikes, no malaria, no political nor social ostracism.

It is central as to the trade of the United States and near the seaboard cities.

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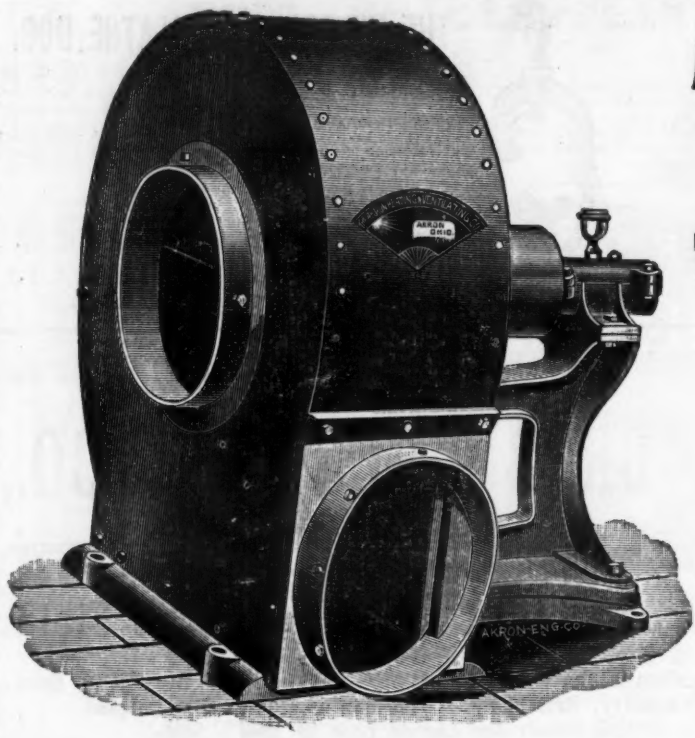

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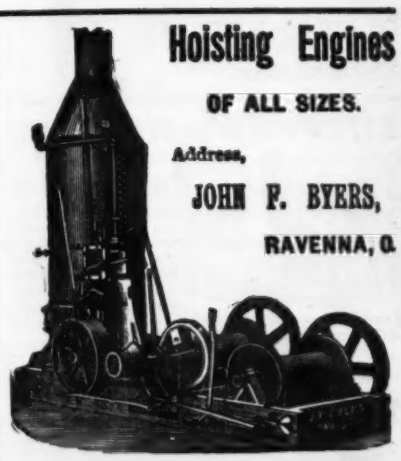

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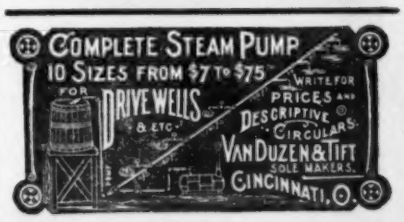
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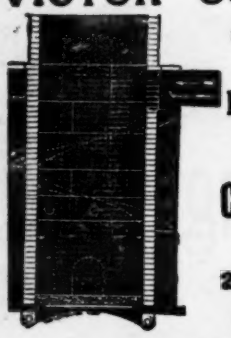

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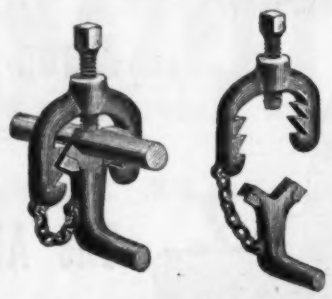

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They are made of steel castings and fitted with steel set-screws. If your Tool Supply Dealer has not these in stock, send your order direct to us and it will receive prompt attention.

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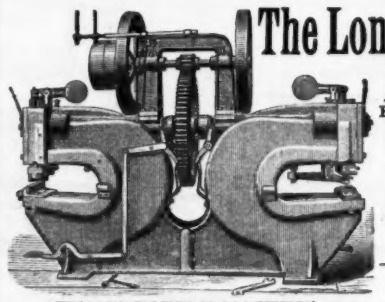

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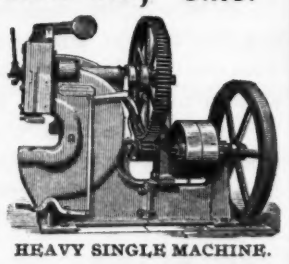

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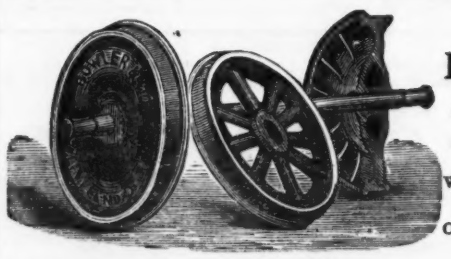

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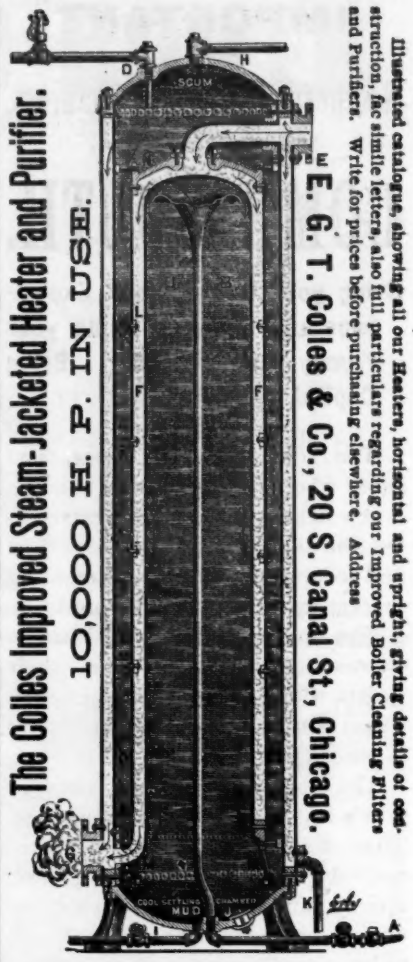
HEAVY CASTINGS.
ARCHITECTURAL WORK in all its branches.
Car Wheels
With or without axles, Street Railroad Wheels and Track Supplies.
Office 14 Winter St. CLEVELAND, O. } BOWLER & CO.



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10,000 H. P. IN USE.

Illustrated catalogue, showing all our Heaters, horizontal and upright, giving details of construction, fac simile letters, also full particulars regarding our Improved Boiler Cleaning Filters and Purifiers. Write for prices before purchasing elsewhere. Address

E. G. T. Colles & Co., 20 S. Canal St., Chicago.

Shipman Automatic Steam Engine; petroleum, kerosene or natural gas fuel. Automatic in fuel and water supply. Stationary and marine. 1, 2, 4, 6 and 8 horse-power single; 8, 12, 16 and 22 horse-power compound. No engineer. Send for catalogue. Mention *Iron Trade Review*. C. H. PRESLEY, manufacturers' supplies, tools and machinery, 24 So. Water St., Cleveland, O.

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OHIO PULLEY & MACHINE CO.
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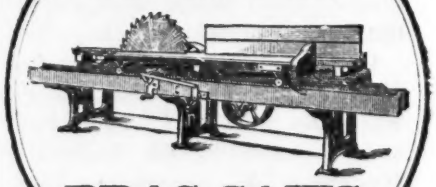
THE EARTH IS OUR FIELD.
To Agents.
Picket Mills



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HORSE POWERS.
Address
B. C. Mach'y Co.,
Battle Creek, 34 Level St., Mich.

Steam Jet Pumps,	- From	$4.00 up.
Automatic Injectors,	- "	$5.00 up.
High Lifting Injectors,	"	$6.00 up.
Shafting, Hangers,	- - "	$1.00 up.

COUPLINGS, BOXES, COLLARS, ETC.
Write for Circulars, Etc.
COLUMBIA INJECTOR CO., CLEVELAND, O.

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RADIAL DRILLING MACHINES
THREE DESIGNS, SIX SIZES
EMBODY ALL DESIRABLE FEATURES
PRICES $450.00 & UPWARD
ADDRESS UNIVERSAL RADIAL DRILL CO
CINCINNATI, O. U.S.A.

IRON AND STEEL MARKETS.

PIG IRON.

CLEVELAND (f. o. b. cars, net cash): Bessemer, $17 30; No. 1 Foundry, $16 80; No. 2 Foundry, $15 80; No. 1 Gray Forge, red short, $14 80; No. 2 Gray Forge, neutral, $14 30; No. 1 American Scotch, $16 80; No. 2 American Scotch, $15 80.

CHICAGO (reported by Messrs. Rogers, Brown & Merwin): Southern Coke No. 1 foundry, $16 25@17 00; Southern Coke No. 2 Foundry, $15 50@16 50; Southern Coke No. 3 Foundry, $15 00@16 00; Southern Coke No 1, Softeners, $15 50@16 50; Southern Coke No. 2, Softeners, $14 75@15 50; Ohio Silveries No. 1, $18 00@18 75; Ohio Silveries No. 2, $17 00@17 75; Ohio Strong Softeners No. 1, $18 25@19 50; Ohio Strong Softeners No. 2, $17 50@18 75; Lake Superior Charcoal Nos. 1 to 6, $19 00@20 00; Tennessee Charcoal No. 1, $19 00@20 00; Tennessee Charcoal No. 2, $18 00@19 00; Southern Standard Car Wheel, $22 00@24 50; Tennessee Standard Car Wheel, $19 50@20 50.

CINCINNATI (reported by Rogers, Brown & Co.): FOUNDRY IRONS—Southern Coke, No. 1 foundry, $15 25@15 75; Hanging Rock Coke, No. 1 foundry, $17 00@18 00; Jackson Co. Stone Coal, No. 1 foundry, $17 00@17 50; Tennessee Charcoal, No. 1 foundry, $17 00@18 00; Hanging Rock Charcoal, No. 1 foundry, $21 00@22 00. MILL IRONS—Standard Southern Coke, grey forge, $13 25@13 50; Standard Southern Coke, mottled, $12 75@13 00; Cold Short Southern Coke, grey forge, $13 00@13 50; Strong Ohio Neutral Coke, grey forge, $15 50@16 00. CAR WHEEL AND MALLEABLE—Standard Alabama Car Wheel, $21 00@22 00; Tennessee Car Wheel, $20 00@20 50; Lake Superior Car Wheel, $20 50@21 50.

BUFFALO (reported by Rogers, Brown & Co.): Mahoning and Shenango Valley strong, No. 1 Foundry, $17 50@00 00; Mahoning and Shenango Valley strong, No. 2 Foundry, $16 50@00 00; Ohio Softener No. 1, $17 50@00 00; Ohio Softener No. 2, $16 50@00 00; Jackson Co. Silveries, $18 00@19 00; Lake Superior Charcoal, $20 50@21 00; Tennessee Charcoal, $19 50@00 00; Southern Softener No. 1, $16 50@00 00; Southern Softener No. 2, $15 75@00 00; Southern Strong No. 1 Foundry, $17 00@00 00; Southern Strong No. 2 Foundry, $16 50@00 00; Alabama Car Wheel, $23 00@24 00; Hanging Rock Charcoal, $23 00@24 00.

LOUISVILLE (reported by Hall Bros. & Co.) HOT BLAST FOUNDRY—Southern coke No. 1, $14 25@14 50; Southern coke No. 2, $13 75@14 00; Southern coke No. 3, $13 25@13 75; Mahoning Valley (Lake ore mixtures), $00 00@00 00; Southern charcoal, No. 1, $16 50@17 00; Southern charcoal, No. 2, $16 00@16 50; Missouri charcoal, No. 1, $17 50@18 00; Missouri charcoal, No. 2, $17 00@17 50. FORGE—Neutral coke, $12 50@13 00; Cold short, $12 50@13 00; Mottled, $12 00@12 25. CAR WHEEL AND MALLEABLE—Southern (standard brands), $21 00@22 00; Southern (other brands), $17 50@18 00; Lake Superior, $21 50@22 50.

ST. LOUIS (reported by Rogers, Meacham & Shields): HOT BLAST COKE AND CHARCOAL—Southern Coke No. 1, $15 50@16 00; Southern Coke No. 2, $14 75@15 25; Southern Coke No. 3, $14 25@14 75; Southern Grey Forge, $13 50@14 00; Southern Charcoal No. 1, $17 50@18 00; Southern Charcoal No. 2, $17 00@17 50; Missouri Charcoal No. 1, $16 00@16 50; Missouri Charcoal No. 2, $15 50@16 00; Ohio Softeners, $18 00@19 50. CAR WHEEL AND MALLEABLE IRONS—Lake Superior, $21 25@21 75; Southern, $19 00@22 50. CONNELLSVILLE COKE—East St. Louis, $5 65; St. Louis, $5 80.

DETROIT (reported by William F. Jarvis & Co.): Lake Superior Charcoal, all Numbers, $19 50@20 50; Lake Superior (coke) Bessemer, $18 50@18 75; Katahdin (Maine charcoal), $23 50@24 00; Lake Superior Coke, Foundry, all ore, $18 00@19 00; Lake Superior Coke, Foundry Cinder Mixed, $00 00@00 00; Standard Ohio Black Band, $18 25@18 75; Southern No. 1, $16 00@16 50; Southern Gray Forge, $14 25@14 75; Jackson County (Ohio) Silvery, $18 50@19 00; Old Car Wheel, $00 00@00 00. Connellsville Coke, $4.80.

LOUISVILLE (reported by Geo. H. Hull & Co.): Southern Coke No. 1 Foundry $14 00@14 50; Southern Coke No. 2 Foundry $13 50@14 00; Southern Coke No. 3 Foundry $13 00@13 50; Grey Forge, $12 50@13 00; Southern Coke Silver Grey, $00 00@00 00; Southern Charcoal No. 1 Foundry, $16 00@17 00; Car Wheel, $22 50@23 50.

PITTSBURGH (reported by A. H. Childs): No. 1 Foundry, $17 00@17 25; No. 2 Foundry, $16 00@16 25; Grey Forge, $15 00@15 25; White and Mottled, $14 00@14 25; Warm Blast Charcoal, $18 00@21 00; Cold Blast Charcoal $23 00@27 00; Bessemer, $17 00@17 50.

MERCHANT IRON AND STEEL.

Flat Bar.

1½ to 4 by ⅜ to 1 inch.....1 95
4½ to 6 by ⅜ to 1 inch.....2 05
1½ to 6 by 1⅛ to 2 inch.....2 35
1½ & 1¾ by ⅜ to ½ inch.....2 05
1 & 1¼ by ⅜ to ½ inch.....2 15
⅝, ¾ and ⅞ by ⅜ to ½ inch.....2 35

Round and Square.

1 to 1⅜ inch.....1 95
2 to 2¾ inch.....2 15
2¾ to 3¼ inch.....2 45
3⅜ to 4 inch.....2 95
4⅛ to 4½ inch.....3 45
4¾ to 5 inch.....3 65

Oval.

⅜ to 1¼ inch.....2 35
⅜ to ¾ inch.....2 55
⅞.....2 75
1.....3 15

Half Oval and Half Round.

1½ to 3 inch.....3 05
⅝ to 1¼ inch.....2 65
⅜ to ¾ inch.....3 25
⅞.....3 45
1.....4 95

Heavy Band.

¾ to 6 by ¼ and 5-16 inch.....2 15
to 1⅝ by ¼ and 5-16 inch.....2 25
1¼ to 2 by ⅜ and 5-16 inch.....2 45
1⅛ to 2½ by ⅜ and 5-16 inch.....2 95

Hoops.

1¼ to 4, Nos. 13 to 15.....2 75
1¼ to 2, Nos. 16 to 18.....2 85
1¼ to 2, No. 19.....2 95
1¼ to 2, No. 20.....3 05
1¼ to 2, No. 21.....3 15
1¼ to 2, No. 22.....3 25
15-16, 1 and 1¼, Nos. 13 to 15.....2 95
15-16, 1 and 1¼, Nos. 16 to 18.....3 05
15-16, 1 and 1¼, Nos. 19 and 20.....3 15
15-16, 1 and 1¼, No. 21.....3 25
15-16, 1 and 1¼, No. 22.....3 35
⅞, Nos. 13 to 15.....3 15
⅞, Nos. 16 to 18.....3 25
⅞, Nos. 19 and 20.....3 35
⅞, No. 21.....3 45
⅞, No. 22.....3 55
13-16, Nos. 13 to 15.....3 35
13-16, Nos. 16 to 18.....3 45
13-16, Nos. 19 and 20.....3 55
13-16, No. 21.....3 65
13-16, No. 22.....3 75
¾, Nos. 13 to 15.....3 45
¾, Nos. 16 to 18.....3 65
¾, Nos. 19 and 20.....3 75
¾, No. 21.....3 85
¾, No. 22.....3 95
11-16, Nos. 13 to 15.....3 65
11-16, Nos. 16 to 18.....3 85
11-16, Nos. 19 and 20.....3 95
11-16, No. 21.....4 05
11-16, No. 22.....4 15
⅝, Nos. 13 to 15.....3 95
⅝, Nos. 16 to 18.....4 15
⅝, Nos. 19 and 20.....4 25
⅝, No. 21.....4 35
⅝, No. 22.....4 45
⅝, No. 23.....4 65

Light Band.

1¼ to 6 by ¼ to 3-16 in.....2 35
1¼ to 6 by Nos. 11 and 12.....2 45
1 to 1⅝ by ¼ to 3-16 in.....2 55
1 to 1⅜ by Nos. 11 and 12.....2 65
⅜ and 13-16 by ¼ to 3-16 in.....2 85
⅜ and 1 3-16 by Nos. 11 and 12.....2 95
⅜ and 11-16 by ¼ to 3-16 in.....3 15
⅜ and 11-16 by Nos. 11 and 12.....3 25
⅜ and 9-16 by ¼ to 3-16 in.....3 45
⅜ and 9-16 by Nos. 11 and 12.....3 55
⅛ by ¼ to 3-16 in.....3 75
⅛ by Nos. 11 and 12.....3 85

Wagon Box Iron.

⅜ inch, beveled edge, by Nos. 11 and 12.....2 95
⅜ inch, " " " 13 and 14.....3 15
⅜ inch, " " " 11 and 12.....3 25
⅜ inch, " " " 13 and 14.....3 45

Sheet Iron.

No. 10 to 14.....2 65
No. 15 to 17.....2 80
No. 18 to 21.....3 00
No. 22 to 24.....3 20
No. 25 to 26.....3 35
No. 27.....3 45
No. 28.....3 55

Iron Boiler Plates.

Tank, ¼ inch and heavier.....2 80
C No. 1, " " 3 05
C H No. 1 " " 3 30
C H Flange, " " 4 05
Extra Flange, " 4 55
Solid Fire Box " 5 30

Steel Boiler Plates—1-4 in. and Heavier.

Tank.....3 00
Shell.....3 40
Flange.....3 70
Marine Flange.....4 10
Fire Box.....4 80
Above includes plates 90 inches wide.
90 to 96 in. wide.....¼c ℔ extra
96 to 100 in. wide.....1 c "
100 to 104 in. wide.....1¼c "
104 to 116 in. wide.....special

American Cast Tool Steel.

ROUND, SQUARE AND OCTAGON.	cts. ℔s
1 to 2 in. inclusive	09
9-16 to ⅞ in "	09
7-16 to ⅝ and 2¾ to 3 in	10½
3¼ to 4 in	11
⅝ to 11-16 and 4¼	10½
⅛ to 6 in	11½
¼ to 9-32 and 6¼ to 7 in	12
3-6 in	14

Flats.

cts. ℔s
2 to 9-16 wide by 2 to ⅜ thick.....9

Bessemer and O. H. Steel.

Machinery.....base price, 3 00
Tire....." 3 00
Spring....." 3 50
Sleigh Shoe....." 3 00
Toe Calk....." 3 25
Cutter Shoes, tapered and burr. " 3 25

English Tool Steel.

Jessop's.....16c
Hobson's "Best".....16c
" "Choice".....36c

Burden Boiler Rivets.

⅛, ⅝, 11-16 and ¾ inches diameter.....4 00
Bridge ⅛, ⅝, 11-16 and ¾ inch diam.....4 00

SCRAP IRON AND OLD METAL.

	NET TONS
No. 1 R. R. wrought scrap	$19 00
No. 1 wrought scrap	17 00
No. 1 Machine cast scrap	12 00
Iron axles	24 00
Axle turnings	13 50
Wrought turning (free from cast)	12 00
Cast borings	8 00
Uncut wrought iron boilers	11 00
Steel boiler plates	17 00
Grate Bars	8 00
Pipes and flues (Clean)	13 50
Tank iron	13 50
Hoop and band iron	10 00
Sheet iron	9 50
Wrought drillings	11 00
Malleable iron	10 00

Reported by Messrs. BLACK & POLLOCK, Cincinnati, O.:

Railroad Wrought	$20 00
No. 1 Country Wrought	17 00
Stove Plate	8 75
Machine Castings	11 00
Hoop and Sheet	8 00
Casting Borings	9 00
Wrought Turnings	13 00

CLEVELAND ROLLING MILL CO.,

MANUFACTURERS OF

BESSEMER STEEL RAILS,

Blooms and Billets, Steel Angles, Forgings, Bar and Spring Steel, Steel Street Rails, Steel Oil Barrel Hoops, Wire of all Kinds, Iron and Steel Boiler Plates, Galvanized and Black Sheet Iron, Corrugated Iron Roofing, Sheet Steel.

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MANUFACTURERS OF

SHEET IRON AND SHEET STEEL

CAMBRIDGE REFINED IRON TRADE MARK — Squared Roofing Sheets a Specialty — CAMBRIDGE SOFT STEEL TRADE MARK

CAPACITY RANGES FROM No. 30 26 INCHES WIDE TO 1-4 × 40 × 120

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CLEVELAND, O.

Organized 1850.

Total Production to Date, 4,200,000 Gross Tons.

Dealers in Lake Superior iron ore from their own mines at Ishpeming, Mich.

Specially adapted for making strong, tough iron, and for carrying large proportions of mill cinder and cold short ores.

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Rooms 716, 717, 718, 719 Perry-Payne Bld'g.

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Successors to Tuttle, Oglebay & Co.,

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FROM MARQUETTE, GOGEBIC AND MENOMINEE DISTRICTS,

CLEVELAND, OHIO.

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J. H. OUTHWAITE & CO.,

Exclusive attention given to

LAKE SUPERIOR AND MENOMINEE RANGE

Iron Ore,

Perry-Payne B'l'd'g. Cleveland, O.

THE CONDIT-FULLER CO.,

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IRON ORE - -

—AND—

- - PIG IRON

Corner Bank and Superior Streets,

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E. C. POPE,

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Iron Ore, Pig Iron

AND METALS.

Cleveland, - Ohio.

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MINERS AND SHIPPERS OF

Ohio Steam Coal and Coke.

Mines on the Cleveland, Lorain & Wheeling R. R. Capacity, 3,000 tons daily.

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Lake Shipping Point, Lorain O.

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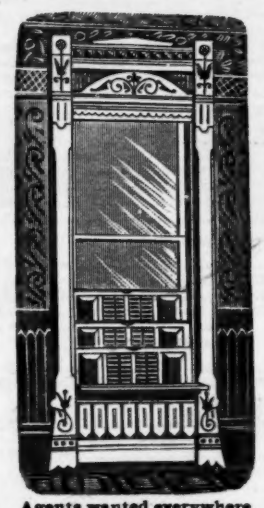
Hartman's Patent Inside Sliding Window Blind



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THE CHEAPEST

ALUMINUM

AS WELL AS THE BEST,

Is offered to the trade by the

Cowles Electric Smelting & Aluminum Co.,

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Price, 2$ per pound for Aluminum contained in an alloy with copper, and $1.60 per pound when alloyed with iron, the same being subject to analysis.

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Rhangaese Bronze, Aluminum and White Silver Bronze. Heavy Castings a Specialty.

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Small Novelties and Toys,

PATENT STOVE-PIPE CRIMPERS,

FOLDING

Camp Stools, etc.

Correspondence solicited.

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ESTABLISHED 1854.

PETER GERLACH & CO.,

MAKERS OF

Saws, Tools and Machinery.

Office and Warerooms, 28 Columbus st. Factories on Columbus, Winter and Leonard streets.

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UNION ELECTROTYPE FOUNDRY

TELEPHONE 2139

829 SHERIFF ST. CLEVELAND O.

MACHINERY SUPPLY MARKET.

Anvils.

American.....₩ lb 9@10
Wrights.....₩ lb 9¾

Bellows.

Blacksmiths' { Hill's.....dis 40 / Bullock's....dis 50&10
Moulders'.....dis 40@40&10
Hand.....dis 40&10@50

Belting.

Boston Belting Co's standard.....dis 70
" " " extra.....dis 60&5
" " " best.....dis 55
Hoyt's Short Lap.....dis 45
Cleveland Rubber Co. extra standard..dis 60&10
Shults Raw Hide Leather Belting, single.....dis 40
Shults Raw Hide Leather Belting, double and Light Double.....dis 40
Standard, oak tanned.....dis 50@60
Alexander Brothers' pure oak tanned. ...dis 45

Blowers and Exhausters.

B. F. Sturtevant's.....dis 20
Boston Blower Co.....dis 35
Buffalo.....dis 35

Borax.

.....₩ lb 9¾@10¾

Chalk.

White.....₩ gross 50
White Crayon.....₩ gross 12@12¾ dis 10
Red.....dis 70
Blue.....dis 85

Chucks.

Cushman's 4 Jaw Independent.....dis 45
" Combination.....dis 40
" Geared Scroll.....dis 30
" 2 Jaw Brass Workers.....dis 30
" Drill.....dis 35
Wescott's Scroll Combination.....dis 33⅓
" Independent.....dis 40
" Little Giant Drill.....dis 30
Horton's Universal.....dis 40
" Independent.....dis 45
Whiton's Independent.....dis 45
National Combination.....dis 40
Sweetland " .....dis 40
Almond Drill.....dis 20
Morse " .....dis 15
Skinner's Combination Lathe.....dis 33⅓
" Independent Lathe.....dis 40
" Universal Lathe.....dis 40
" Drill.....dis 15

Cutters and Reamers.

Cleveland.....dis 10@15
Pratt & Whitney.....dis 10@15
Standard.....dis 10@15
Brown & Sharpe, Milling Cutters.....dis 15
" " Gear Cutters.....dis 15

Crowbars.

Cast Steel.....₩ lb 4
Iron, steel points.....₩ lb 3¾

Drill and Drill Sockets.

Twist drills.....dis 50&10
Morse Taper and Straight shank to 1¾".....dis 50&10
Morse Taper and Straight shank Larger than 1¾".....dis 25
Drill Sockets.....dis 25
Standard Twist Drills.....dis 55@55&5
Cleveland " " .....dis 55@55&5

Emery.

	No. 4 to 46 gr.	No. 54 to 150. gr.	Flour, F.	C. F. FF.
Kegs, ₩ lb	4 c	5 c		2½c
½ kegs ₩ lb	4½c	5½c		2¾c
¼ kegs ₩ lb	4¾c	5¾c		3 c
10 lb cans, 10 in case	6 c	6¾c		5 c
10 lb cans, less than 10	10 c	10 c		7½c

Emery Cloth and Paper.

Barder, Adamson & Co.....dis 45@50
H. H. Barton.....dis 50@50&5

Emery Wheels.

Detroit.....dis 55@60
Norton's.....dis 55@60
Grant.....dis 55@60
Sterling.....dis 60
Celluloid.....dis 10&33⅓
Northampton.....dis 55
Crystal.....dis 65@70
Vitrified.....dis 60
Vulcanite.....dis 10&10

Files.

Nicholson.....dis 60&10@60&10&10
" X. F.....dis 25
Kearney & Foot.....dis 60&10@60&10&10
Black Diamond.....dis 60&10@60&10&10
Arcade.....dis 60&10@60&10&10
Disston's.....dis 65@70
Western.....dis 70
Stub's.....dis 25
Grobet's.....dis 30
Reynolds Bros.' Hand Cut.....dis 50
ndustry File Works, hand cut.....dis 50

Hammers.

P. S. W.....dis 40
Atha new list, Jan. 15, 1887.....dis 50
Heavy hammers and sledges under 5 lbs. 18c over 5 lbs 14c, new list.

Jack Screws.

Illinois Bolt Co. list.....dis 70

Nuts and Washers.

Size of bolt inches	¼	5-16	⅜	½	⅝	¾	1
Square	8	7	5½	4½	4	3½	3⅛
Hexagon	15⅜	11⅜	8⅛	6	5⅛	5⅜	5
Washers	9	8	7	5	4½	4⅜	4⅜

In lots less than 100 lbs, ₩ lb add ¼c., 1 lb boxes add 1c to list.

Nails (wire.)

List July 14, 1887.....dis 70 &10
Standard Penny Nails, ₩ keg card rate { Car lots.....$2.30 / Less than car lots $2.40

Oilers.

Zinc and Tin.....dis 60
Brass and Copper.....dis 50
Malleable (Hammer's), No. 1, $3.60; No. 2, $4.00; No. 3, $4.40 ₩ doz.....dis 10@10&10

Packing, Steam.

Boston Belting Co.....dis 60
American Packing Hemp.....₩ lb 10@11
Russia Packing " .....₩ lb 14
Italian Packing " .....₩ lb 13@14
Piumbago Piston.....₩ lb 40
Morrison's " .....₩ lb 50
Square Flax " .....₩ lb 50
Sheet Rubber.....₩ lb 12&24
Excelsior Rubber.....₩ lb 48

Picks.

Railroads, 5 to 6 lbs.....$12 dis 60
" 6 to 7 lbs.....$13 dis 60

Pulleys.

Iron Pulleys, Walker List.....dis 45
Medart Pulleys.....dis 55
Split Wood Pulleys.....dis 50@55

Rivets.

Iron, Thousand, list November 17, ...dis 50
Iron, Ordinary, Cooper's Block and Carriage list November 17.....dis 50
Copper.....dis 50@50&10

Rope.

Manilla, ¼ inch and over.....₩ lb 15¾
Sisal, ¼ inch and over.....₩ lb 13¾

Sand Paper.

B. A. & Co.....dis 45@50
H. H. Barton's.....dis 40@45
New England Flint.....dis 40@50
Barton's Garnet.....dis 20

Saws.

Disston's Circular.....dis 40@45
" Band.....dis 20
" Scroll.....Net
Hack Saw Stubs.....dis 20
" " Eureka.....dis 20
" " Star.....dis 20
Saw Swages Disston's.....dis 20
Atkins' Cicular Saws.....dis 40&45
" Mill, Mulay and Drag Saws..dis 40&1-
" Wood Saws.....dis 40&10
" Silver Steel Diamond Cross-cut Saws.....dis 70c per ft
" Dexter Cross-cuts.....dis 50c "
" Diamond " .....dis 30c "
" Tuttle Tooth Cross-cuts..dis 25c "
" One-man Cross-cuts.....dis 32c "
No. 1 Handles.....dis 23c per pair
No. 6 " .....dis 16c "
Excelsior Saw Tools.....$6 per doz
Perfection " .....$15 "
Detroit Saw Works, Circular.....dis 50
" " " Band.....dis 25
" " " Mulay.....dis 45

Screws.

Wood Screws—List Jan 27, 1889.

Flat head iron	dis 50
Round head iron	dis 40
Flat head brass	dis 45
Round head brass	dis 35
Square Cap	dis 65
Hexagon Cap	dis 60
Set C. H. C. P.	dis 70
Machine, flat head, iron	dis 65
Machine, round head, iron	dis 60
Bench and hand—	
Lag or coach	dis 75@75&10
Coach, patent gimlet point	dis 75

Shovels and Spades.

Ames' list November 1, 1885.....dis 20
Dennis.....dis 5.25
Hussey & Binns, railroad.....dis 8.00

Taps.

Cards, Hand and Nut to 2 in	dis 50
Carpenters' " " "	dis 50
Morse " " "	dis 50
Pratt & Whitney " " new list	dis 10
Machine Screw Taps	dis 55
Pipe Taps to 2½ in	dis 70
Stay Bolt Taps	dis 25
Stove Bolt Taps	dis 50
Pulley Taps	dis 40

Twine.

	BC.	B.
No. 12, Flax Twine, ¼ and ⅛ lb Balls	21c@29c	
No. 18 " " ¼ and ¼ "	18c@28c	
No. 36 " " ¼ and ¼ "	16c@27c	
2-Ply Hemp, ¼ & ⅛ lb Balls (Spring Twine)	11½c	
3-Ply " 1 lb Balls	12@12½c	
3-Ply " 1½ lb Balls	11@11½c	
Cotton Wrapping, 5 Balls to lb	15@16c	

Vises.

Solid Box.....dis 60
Parker's.....dis 20@25
Prentiss.....dis 20
Stephen's.....dis 25@30
Barrett's.....dis 30
Miller's Falls.....dis 40
Merrill's.....dis 10@15
Howard.....dis 30

Wire.

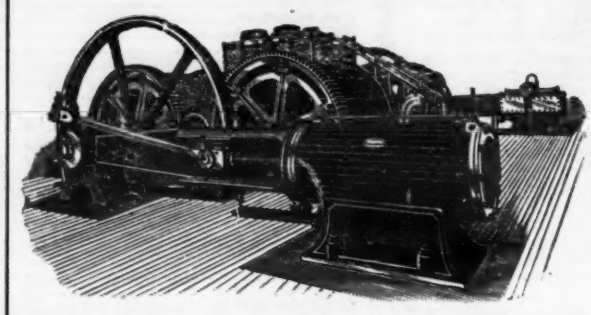
New List, Jan. 18, 1884

Brass and copper	dis 20@25
Bright and annealed, Nos. 0@18	dis 70&10@75
" " Nos. 19@26	dis 75@75& 5
" " Nos. 27@36	dis 75&10& 5
Coppered Nos. 0 to 18, market list	dis 70@70& 5
Galvanized Nos. 0 to 18 " "	dis 65&5
Tinned market Nos. 0 to 18	dis 67½
Cast steel	dis 50
Tinned Broom Wire	dis 70&5@70&10
Annealed Fence, Nos. 8 and 9	dis 75
Annealed Grape, Nos. 10 to 14	dis 75
Stub's Steel Wire regular	$6.00@lb dis 3

Wrenches.

Coe's genuine,	dis 50
Girard Standard	dis 70&10
Agricultural	dis 75&10
Mechanics'	dis 55&10,& 3
Bemis & Call's Combination	dis 35
Donohue's Engineers	dis 20&10
Lamson & Sessions Engineers	dis 60
Billings & Spencer's Drop Forged	dis 10
William's " "	dis 10
Alligator " "	dis 40

Webster, Camp & Lane Machine Co.



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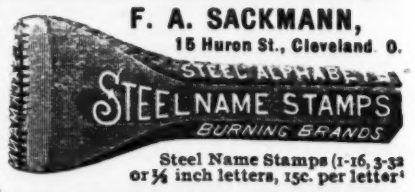

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WOOD WORKING MACHINERY.

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SOLICITOR & COUNSELLOR, City Hall Room 48.

PATENTS THOMAS P. SIMPSON, Washington, D. C. No atty's fee until Patent obtained. Write for Inventor's Guide.

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Augers and Bits.

Common augers and bits.....dis 70
Snell's.....dis 60&5
Cook's Douglass Mfg. Co.....dis 55
Russell Jennings' augers and bits.....dis 25
Expansive Bits, Clark's small, $18; large, $26.....dis 35@35&5
Hollow Augers, Ives'.....dis 25&10
Hollow Augers, Bonney's Adjust. ₩ doz., $48.....dis 40&10
Hollow Augers, Stearns' Adjust. ₩ doz., $48.....dis 20&10
Gimlet bits, common.....per gross $3 25@4 00
Standard Bit Stock Drills.....dis 50&10&5
Ship Augers.....dis 15&10@15&10&5

Axes.

Makers' and Special Brands—
First quality.....₩ doz $8 00
Others.....₩ doz $7 00
Full polished.....₩ doz $9 00

Bolts.

Cast iron barrel bolts.....dis 70
Cast iron shutter bolts, etc.....dis 70
Cast iron chain bolts.....dis 65&10
Ives' patent door bolt.....dis 60
Wrought iron barrel bolts.....dis 70
Wrought iron square bolts.....dis 70
Wrought shutter bolts.....dis 60&10
Carriage, common, new list.....Sargent's list dis 70&10&5
Tire, common, new list.....dis 70
Carriage and tire, Philadelphia pattern.....dis 75&10
Stove bolts.....dis 60
Plow bolts.....dis 60&5
Machine.....dis 75&10@80
Ends.....dis 75&10&80

Buckets, Elevator.

.....dis 50&10

Butts.

Wrought brass.....dis 75&10
Cast brass, loose joint.....dis 33⅓
Cast Iron—
Fast joint, narrow.....dis 50&10&5@60
Fast joint, broad.....dis 50&10@60
Loose joint.....dis 70&10
Loose joint, jap.....dis 70&10
Loose joint, jap. with acorns.....dis 70&10
Loose pin, acorns.....dis 70&10
Loose pin, japanned acorns.....dis 70&10
Loose pin, acorns, jap. plated tips.....dis 70&10
Wrought steel—
Wrought, fast joint, narrow.....dis 70&10
Wrought, fast joint, broad.....dis 70&10
Wrought, loose joint, broad.....dis 70&10
Table Butts, back flaps, etc.....dis 70&10
Regular inside blind.....dis 70&10
Light inside blind.....dis 70&10
Loose pin.....dis 70&10
Light loose pin.....dis 70&10

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No. 1—Slaters'	$1.25
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"C," Stringed Roofing, Heavy	2.00
Stringed, Rosin-Sized	1.00

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Asphaltum, Trinidad Refined, ₩ ton.....$30.00
Asphaltum, Fine Grade, ₩ lb.....08
Coal Tar Felt, 1 Ply, ₩ lb.....02
Coal Tar Felt, 2 Ply, ₩ roll 108 sq ft.....1.42½
Coal Tar Felt, 3 Ply, ₩ roll 108 sq ft.....1.85
Roofing Pitch, ₩ gal.....09

Chains.

Revised List.

Trace, 6¼-10-2.....₩ pair 1.03
Trace, 6¼-10-3.....₩ pair .92 .....50&10
Trace, 7-10-2.....₩ pair 1.11
German Halter Chain, list June, 1887...dis 50&10
German Coil, list of June, 1887.....dis 50&10@60
Galvanized Pump Chain.....₩ lb 5½@6
Jack Chain, Iron.....dis 75&10
Jack Chain, Brass.....dis 75

Chisels.

Socket Framing and Firmer.....dis 75
Socket Framing and Firmer, Buck Bros..dis 30
Socket Firmer and Framing, L. & I. J. White.....dis 30@30&5
Tanged Firmers.....dis 40&10

Cutlery.

Table.....net
Excelsior Pocket.....net

Fibre Ware—Standard.

	Nos. 1	5.	5X.
Pails, water, 12 qt	$4 00	$4 50	$.....
Dairy, 14 qt	4 50	5 00	.....
Fire 12 qt	5 00	.....	.....
Sugar	6 00	6 50	.....
Horse	.....	5 00	.....
Buggy	4 00	.....	.....
Chamber, Slop, Commode (5 and 5X 14 qt)	6 50	7 50	8 50
Ears, slop, 5 and 5X 14 qt	8 00	9 00	10 00

	Nos. 1	5.	5X.
Basins, wash—			
10¾ inch	2 00	2 25	.....
12 inch	2 25	2 75	3 25
13¾ inch	2 75	3 25	3 75
15 inch	3 25	3 75	4 25
Bowls, fruit	.....	2 50	.....
Servers, 12 in	.....	2 25	.....
Baskets, waste paper, 13 in	.....	6 00	.....
Spittons, "Daisy," pressed			
8 inch	4 00	4 50	5 00
10 and 11¾ inch	6 00	6 50	7 50

No. 1 plain; No. 5 decorated; No. 5X White decorated.

Gimlets.

Nail and Spike.....dis 50&10&5
Double cut, low list.....dis 25
"Bee".....₩ gross $12, dis 25@25&5

Hanger

Barn door, old patterns.....dis 60&10&10@70
Climax, (Anti-Friction).....dis 60
Scranton.....dis 33—
Kidder's.....dis 50&10@60
Terry's Patent.....5 in., $12; 4 in., $10, dis 50&5
Paragon.....dis 40&10
Richard's.....dis 30@30&10

Horse Nails.

	No.	10	9	8	7	6	
Ausable, ₩ lb.		23	24	25	26	28	dis 40
Putnam, ₩ lb.		18	19	20	21	23	dis 15
Essex							dis 25&10

Horse Shoes.

Burden, at factory.....₩ keg $4 00
R. I. Horshoe Co., Perkins' Imp. at factory.....₩ keg $4 00
Mule Shoes, at factory.....₩ keg $5 00

Knobs.

Carriage, japanned.....₩ gross 80c dis 60&10
Base, rubber tip.....dis 70&10&5
Hematite door knobs, new list.....dis 40&10@50
Door mineral.....dis 65c@68c
Door Por. japanned.....dis 75c@78c
Door Por. nickle.....$2 00@2 25
Door Por. plated.....$2 00@2 25

Locks, Bolts, Etc.

P. & F. Corbin, Locks and Bronze Goods.
Door locks, knobs and latches.....dis 60&10
Escutcheons and keys.....dis 60&10
Padlocks and padlock keys.....dis 75
Bell pulls, mineral, porcelain and jet dis 60&10
Bell pulls, genuine bronze.....dis 60&10
Lever bell pulls, genuine bronze.....dis 60&10
Butts', genuine bronze.....dis 60&10
Butts' bronze plated.....dis 60&10
Store door locks and latches.....dis 60&10
Store door handles.....dis 60&10
Shutter hinges&flaps, genuine bronze.dis 60&10
Shutter hinges, bronze plated.....dis 70
Flush bolts, genuine bronze.....dis 70
Shutter knobs, genuine bronze.....dis 50
Shutter bars, genuine bronze.....dis 60
Sash lifts, genuine bronze.....dis 60
Sash pulls and plates, genuine bronze.....dis 60
Push plates, genuine bronze.....dis 60
Drawer pull, genuine bronze.....dis 70
Letter box plates, genuine bronze....dis 60&10
Barn door locks.....dis 33⅓
Bishop's Buckeye Sash Locks.....₩ gross $4.80

Plumbs and Leve s.

Standard list.....dis 70&10
Pocket levels.....dis 70&10
Davis' inclinometers.....dis 10&10

Pumps.

Cistern, best makers.....dis 50&10@60
Pitcher spout, best makers dis 60&10@60&10&10
Pitcher spout, cheaper goods.....dis 70@70&5

Pokes, Animal.

Bishop's I. X. L.....₩ doz $6 00
Bishop's O K.....₩ doz $5 25
Bishop's Pioneer.....₩ doz $3 75
Bishop's American.....₩ doz $2 75

Rakes.

Cast steel.....dis 70
Malleable.....dis 70@70&5

Razors.

J. R. Torrey Razor Co.....dis 20
Wostenholme & Butcher.....$10@24...dis 10
Rifle razor.....dis $9 50 net

Rat Killers.

Schuyler's.....₩ gross $15 00

Scales.

Hatch, Counter, No. 171.....₩ doz $21 00
Hatch, Tea, No. 161.....₩ doz $6 75@7 00
Chatillon's Grocers.....dis 50
Family Turnbulls.....dis 30@30&10
Scale Beams, List of January 12, 1882.....dis 50&10@50&10&4

Screw Drivers.

Stanley R. & L. Co.'s Varnished Handles.....dis 65&10
Stanley R. & L. Co.'s Black Handles..dis 60&10
Sets interchangeables.....₩ doz $18 dis 25

Squares.

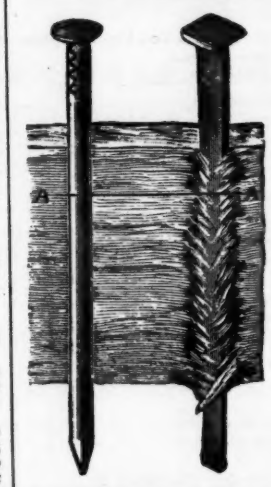
Steel and iron.....dis 75&10@80
Nickel plated.....
Disston's try square and T bevels.....dis 45&10
Winterbottom's try and miter.....dis 30&10

Tacks, Brads, Etc.

New List, Oct. 19, 1890.

American iron carpet tacks all kinds.....dis 77½&10
Steel carpet tacks all kinds.....dis 75&10
Swedes iron carpet tacks, all kinds.....dis 75&10
Swedes iron tacks.....dis 75&10
Swedes iron Upholsterers' tacks.....dis 75&10
Tinned Swedes iron tacks.....dis 77½&10
Tinned Swedes iron Upholsterers' tacks.....dis 77½&10

American iron cut tacks	dis 77½&10
Copper tacks	dis 4 &10
Copper finishing and trunk nails	dis 50&10
Cigar box nails	dis 50&10
Finishing nails	dis 6 &10
Hungarian nails and miners' tacks	dis 60&10
Gimp and lace tacks	dis 77½&10
" " " tinned	dis 60&10
Trunk and clout nails	dis 72½&10
Tinned trunk&clout nails	dis 60&10
Basket nails	dis 66&10
Chair nails	dis 66&10
Common and patent brads	dis 66&10



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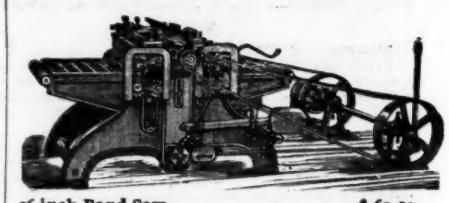

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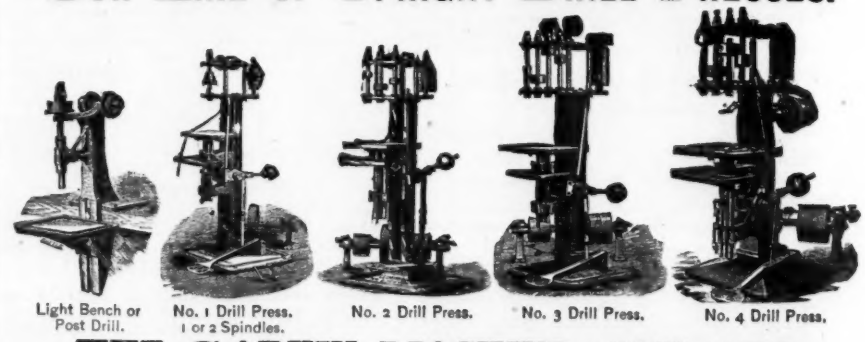

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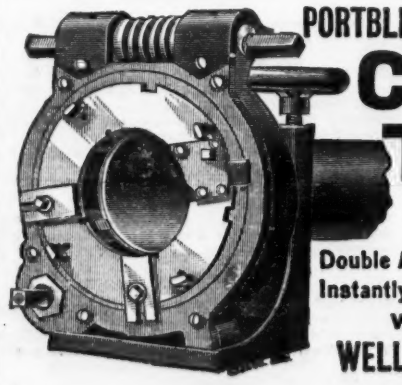

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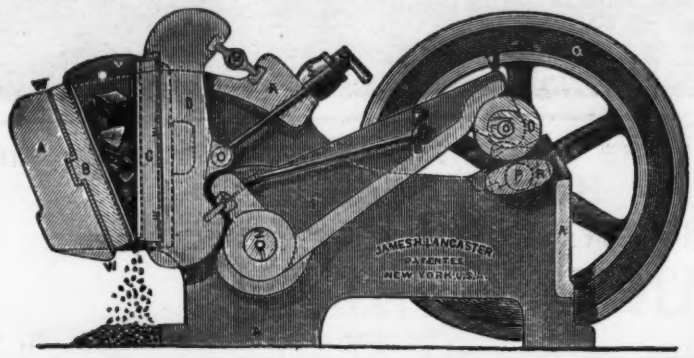

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Pittsburgh Express	†6 25 p m	
Youngstown Local	†8 05 a m	
Mahon'g div. & Pitts Local		*11 40 a m
Mahoning Val. Accom		†4 30 p m
Pittsburgh Express	†1 20 p m	11 10 p m
New York Express	*8 00 p m	

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Canton—6:50 a. m., 3:00 p. m., 6:20 p. m.
Kent—6:50 a. m., 3:00 p. m., *5:45 p. m. 6:20 p. m.
Bedford—6:50 a. m., 11:10 a. m., 1:30 p. m., 3:00 p. m., 4:40 p. m., *5:45 p. m., 6:20 p. m. 10:35 p. m.
Newburgh—6:15 a. m., 6:50 a. m., 11:10 a. m., 1.30 p. m., 3:00 p. m., 4:40 p. m., *5:45 p. m., 6:20 p. m., 10:35 p. m.

Arrive from—

Zanesville and Coshocton—10:30 a. m., 6:30 p. m.
Canton, 10:30 a. m., 2:35 p. m., 6:30 p. m.
Kent—*8:10 a. m., 10:30 a. m., 2:35 p. m., 6:30 p.m.
Bedford—6:00 a. m., *8:10 a.m., 10:30 a.m., 1:05 p. m., 2:35 p. m., 4:15 p. m., 6:30 p.m., 7:10 p.m.
Newburgh—6:00 a. m., 7:15 a. m., *8:10 a. m., 10:30 a. m., 1.05 p. m., 2:35 p. m., 4:15 p. m., 6:30 p. m., 7:10 p. m.

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	d11 10 p m	6 35 p m
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	*11 10 p m	.....
Alliance Accom.	3 25 p m	10 10 a m
Ravenna Accom.	5 00 p m	8 25 a m

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FOR AKRON, CANTON AND MARIETTA.

Depot foot South Water Street.

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	d 8 00 p m	5 40 p m
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No. 66, Mantua Accommo	* 4 20 p m
No. 74, Youngst'n Ex	† 6 00 p m
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No. 71, Youngstown Accom	* 7 15 a m
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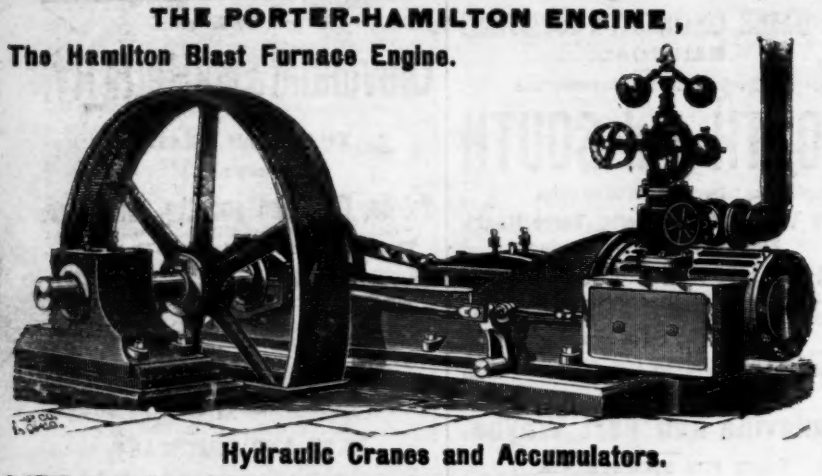
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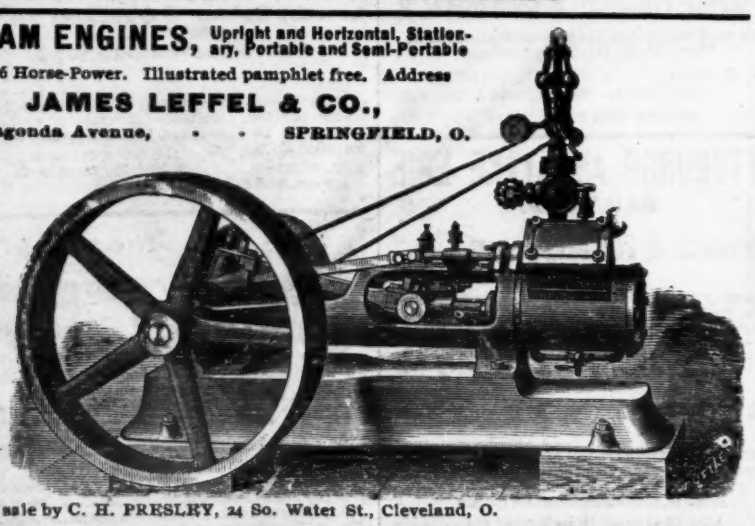
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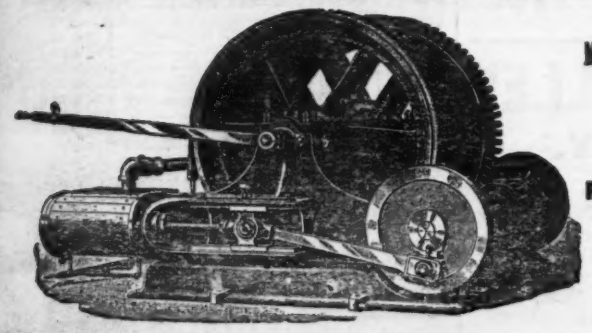
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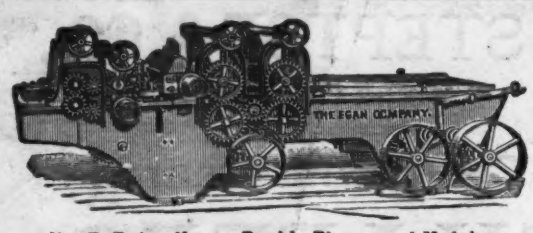

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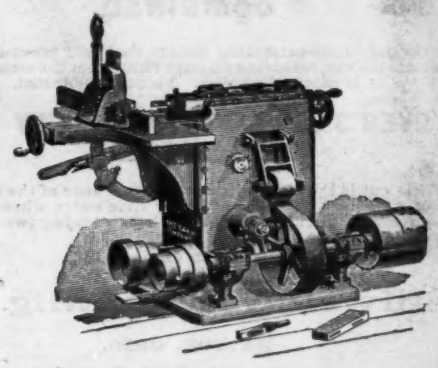

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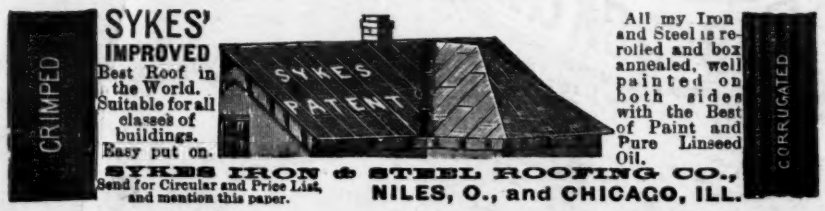
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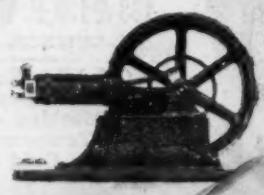

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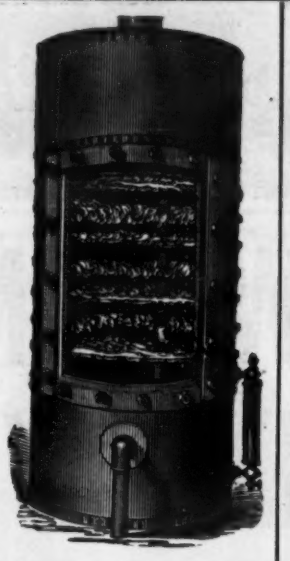

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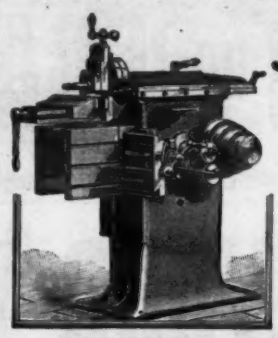

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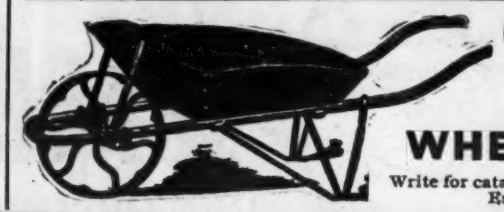

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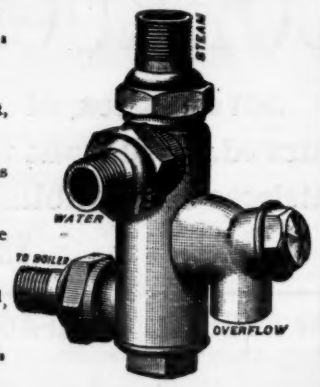

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